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THE EXTRAORDINARY VOUGHT MODEL UO AIRPLANES REFLECT THE ART OF THE DESIGNER WHO, IN CLOSE CO-OPERATION WITH THE UNITED STATES NAVY DEPARTMENT, HAS HAD UNTRAMMELED OPPORTUNITY, AND EVERY ENCOURAGEMENT, TO CARRY OUT HIS BEST IDEAS.

THE SPIRIT OF THE ORGANIZATION WHICH BUILDS VOUGHT AIRPLANES IS TO PURSUE AN EVER-ADVANCING STANDARD OF SUPER-EXCELLENCE FOR THESE SPLENDID AIRCRAFT.

LONG ISLAND CITY

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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

VOL. NO. 52, NO. 2 FEBRUARY, 1926 WHOLE NO. 276

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Winner of Battle Efficiency Pennant 1925, also winner of Gunnery Trophy.

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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

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NATIONAL POLICY AND NAVAL POWER

BY WILLIAM HOWARD GARDINER

THERE is much current discussion as to whether our Navy is what it should be; as to whether aviation should be taken from it, and from the Army, to form a separate air force; as to whether a consolidated "Department of Defense" should be set up. In all this the emphasis seems usually to be laid on the defense of our homeland against invasion. That, of itself, calls for some understanding of the principles of warfare in general and of naval warfare in particular; for it is well recognized that the Navy is our first line of defense. But if we take also into consideration our position in the world, our broader interests, and our consequent policies, it becomes apparent that upon sound solution of these martial questions depend matters of far greater present and prospective importance to us and to the world.

I

Our geographic position and outlook take on a new aspect when considered in relation to the outstanding terrestrial feature of the globe. This is what some call the world-continent, made up of Europe, Asia, and Africa, in which are about 85 per cent of the human race. Undoubtedly the greatest single influence upon its economic, political, and martial affairs since the Middle Ages has been that exercised by England because her insular position off its western coast enabled her usually to control the overseas communications of Continental Europe and thus to have the determining voice in the world affairs that centered there. This accomplish-

ment has naturally led the Japanese to picture themselves as similarly controlling Eastern Asia because of the analogous position of their archipelago; and in this prospect may be seen the birth of a new focus of more or less extensive world power. But as both of these insular foci are in close proximity to much greater natural and human resources, each must concern itself primarily with the affairs of its vicinity; and one of the most important facts in the strategic world is that these two regional foci are over 10,000 miles apart by the shortest navigable route.

In contrast to the world-continent is the hemisphere of the great oceans in the upper center of which is North America; for Japan is only 4,000 miles from our Pacific ports, as against the 3,000 that separate England from our Atlantic coast, while Panama and South America are 1,500 miles from our Gulf States.

Although the land and population of the United States are only about 6 per cent of those in the world, we produce nearly half the world's consumption of coal and between half and three quarters of its iron and steel, petroleum, copper, lead, zinc, timber, and so forth, as well as much of its machinery and other manufactures. This has led many to look upon our country, together with its neighbors to the north and south, as a self sufficient continent. But this point of view overlooks the dependence of our home industries upon imports of such necessities as rubber, jute, tin, and manganese. In the telephone on every desk are materials from sixteen countries. As Dr. Bell, of our Department of Commerce, has recently told us, "the United States is today a food importing nation, measured in dollars—that is, we import more sugar, tea, coffee, spices, nuts, and tropical fruits than we export of wheat and meat." Nor should it be forgotten that we have to import from overseas more than two dozen kinds of foreign materials essential for the conduct of modern warfare. So our security in war, as well as our standard of living in peace time, is dependent on the reliability of our means of overseas communication.

Such considerations, coupled with the fact that, in practice, all intercourse between North America and all other parts of the world must pass overseas, have led those with a broader outlook to think of America as a great midoceanic island rather than as a self-sufficient continent; for the dependence of a people on overseas communications, rather than the greater or less extent of their territory, is what makes them insular in their outlook. This in-

sular point of view as to America has been strengthened of late by the increasing importance to us of the economic, political, and martial conditions of the countries across the Atlantic, the Pacific, and the Caribbean. Thus our situation has come to be not dissimilar from that of any other island power except in the magnitude of our base and of its human and natural resources, in its remoteness from greater aggregations, and in its incomparable central position which gives us "interior lines" in the world of maritime trade and strategy.

II

Under such circumstances the interests and policies of the United States have special significance. As with other peoples, our greatest concern is naturally for our well-being at home. But the record of recent years has shown that this has become closely related to our trade abroad because, as this external trade of 100,000,000 tons annually is worth not far from a fifth of the net value of our purely domestic commerce, any marked fluctuation in it may well turn the scale of our prosperity. Indeed, it is well to realize that our present external trade and investments are worth more than was the total wealth of the United States only fifty years ago.

Having the highest scale of living, largely dependent on the greatest and most rapidly increasing export trade and external investment in the world, it follows that, to maintain the security of our conditions at home, in the broadest sense, we must foster the activities abroad upon which our well-being is increasingly dependent, and from this latter it follows that we are directly concerned in such prosperity in other countries as will best serve the peaceful flow of our trade throughout the world and assure our foreign investments. But at the same time, whether consciously or not, we are concerned in there being such a set of checks and balances overseas as will prevent isolated or combined action detrimental to any of our interests abroad or at home.

At this point it may be well to recall that, in addition to the Monroe and Open Door Doctrines, the policies of the United States include that of avoiding all entangling alliances or indeterminate commitments; autonomy of customs tariffs and the exclusion of undesired foreign products, by force if need be; the limitation of immigration and the exclusion of those deemed in-

dividually undesirable or racially unassimilable; the exclusive military control of the Panama Canal, which now has a traffic greater than that of Suez, and of its contiguous waters; the maintenance of our coastal shipping laws, as a domestic matter, in the face of such attempts to break them as that we recently frustrated at Brussels; and in general, to secure respect for the policies of the United States and for the persons, rights, and interests of our citizens upon all the seas and in all lands.

Many of these policies evidently look to assuring our internal security, stability, and prosperity and are essentially domestic. But the case of China—where even now we cannot be sure that non-Chinese are not generally considered to be inferior "barbarians"—shows that the holding of a point of view or domestic policy does not suffice. Nor is it sufficient for us to be able to stop impingements at our borders; for when a nation's interests are to be found in all parts of the world, it is *where they are* that respect for them has to be secured, especially when they are as important to the well-being of the home population as is now the case with us. And in this connection it is well to realize that such regard by others for our interests abroad would automatically assure our security at home.

III

A phase of the Monroe Doctrine and, more particularly, of the Open Door Doctrine illustrates how American policy, for over a century, has sought not only to obtain peaceful regard for some of our interests abroad, as well as looking to our security at home, but has aimed to bring about an unprecedented improvement in international relations.

The Monroe Doctrine of 1823 looked not only to warding off encroachments into the American hemisphere that might prove dangerous to the United States and thus preserving the nascent liberties of the Latin-American countries; it sought also to keep those countries open to the considerable trade we had built up during the Napoleonic wars, a trade from which their former suzerains surely would have excluded us had they reconquered their lost colonies. But while in the Monroe Doctrine the emphasis is against territorial sequestrations and the trade consideration is secondary, the reverse is the case in the Open Door Doctrine. For in the latter the primary tenet is that though a country may make its own tariff and other trade regulations respecting foreign

enterprise in it, these should be applied without discrimination, giving equality of economic opportunity as among the nationals of all other countries; and to this the natural corollary is that there should be no sequestrations of the territories of organized governments such as result in some one's getting preferential opportunities therein.

In passing it is well to note that the United States first announced the Open Door Doctrine on the coast of Africa in 1832, in China in 1842, and later in Japan, Korea, and elsewhere. But while seeking openings for our trade on the basis of equal opportunities for all, we were so opposed to special privilege that in 1856 we declined the Siamese offer of a monopoly of their trade; and the next year we abstained from taking Formosa although American enterprise had kept our flag flying over part of it for some twelve months in anticipation of its immense value to the United States as a commercial coaling station and base in the Orient. In short, as Dennett tells us in his illuminating history of *Americans in Eastern Asia,* the Open Door Doctrine had been so fully developed before 1869 that no new principle has been added to it since then, neither Hay in 1900 nor Hughes in 1922 seeming to have thought that they were creating anything new. Nevertheless, it was only a few months ago that all the principal powers, except Russia and Germany, were brought to agree to this doctrine in a joint treaty as to China.

That nearly a century of American diplomatic effort intervened between our announcing this doctrine and our securing such a formal commitment to it is not surprising. For among nations, as among individuals, the custom of the ages has been to seek and to hold preferential rather than merely equal opportunities.

From time immemorial the struggles and rivalries of the strong and aggressive have been to secure some form of special privilege or advantage for themselves, usually at the expense of the weaker —whence most of the wars of aggression and the empire building of the past. But the Open Door proposes that trade and other economic opportunities in disputable countries shall be open to the nationals of all others on terms of equality among the latter—and that thus there shall be no such occasion for any to sequestrate territory or to subjugate others.

This would substitute peaceful and nondiscriminatory trade and enterprise for territorial empire building with a view to special privilege. And as most wars of aggression have been under-

taken to gain some such advantage, it follows that, if the doctrine of open and equal opportunity were really to be put into general practice, one of the principal causes of war would be eliminated. Naturally, such a procedure holds out far greater promise of reducing war than can reasonably be expected from international plans for hypothetical joint action against each threatened or actual outbreak; for it aims to remove a major cause and incentive of war rather than merely to treat each bellicose symptom of aggressive ambition.

But the record of the Open Door, from its earliest days, has been one of lip-service in principle and violation in practice. Nor is the United States free from responsibility for this, because, while we have advocated this doctrine consistently—although somewhat intermittently—for almost a century, we have frequently followed what may have seemed to be our immediate interest in some other respect rather than go to the pains of giving adequate practical support to our thesis. It was but natural, therefore, that such violations of it as the sequestrations of Indo-China and of Korea have occurred. And if we view this record with a realization that the major motives and characteristics of human nature change but little, we must expect that in future, as in the past, this beneficent and far reaching doctrine will be respected merely in proportion to the firmness with which it is upheld.

IV

In order to appreciate the problems on the solution of which depend our security and prosperity, as well as the peace of the world, we should view affairs in a comprehensive and balanced way, surveying them circumferentially as from our detached and midoceanic base. And for this it is of good augur that we are recognizing the interrelations of the world more and more realistically, although for this we are perhaps not a little indebted to the current frankness of some who not long since were hailing us as their saviors. A few outlines may suggest some of the contingencies bearing on our naval policy.

To the north is Canada in the paradoxical position of being for all time most closely associated with the United States while beyond doubt her status as premier Dominion of the British Empire gives her not only special influence in affairs but a peculiar value

to us, both of which would be lost were she to disassociate herself from Britain. To the south there is as yet no considerable focus and balance of power. So we need merely note a temperamental trend there toward European association that has been considerably quickened by the League of Nations. But it is across the Atlantic and the Pacific, where are the other two foci of real power, that there are contingencies that will test our statecraft—and if that fail, our character.

In the tumult of propaganda that accompanied the late war and peacemaking many did not seem to perceive that what the United States did, in effect, was to exercise and redress the balance of power as between the warring nations of Western Europe. And even if we assume that their differences have been composed and that solidarity among them will result from the treaties of Locarno, few seem to realize what has long been apparent, namely, that across the Atlantic the major problem will be to maintain or exercise the balance of power as between Western Europe and Russia, whose characteristic imperialism has but been paraphrased and intensified by her present rulers.

In the final analysis, as was made clear in the late war, the ability of the United States to throw economic or military support on either side of the European scale comes down to a matter of being able to control the conduct of the transportation of our power across the Atlantic—that is, to a matter of shipping power and naval power. And the alternative to such control would be for the United States to be unable to express its influence in Europe except on the side of whoever might control Atlantic transportation—were it not for the exceedingly important fact that the only European power likely to do so has vast interests in America that are as hostages. And in a much broader sense the solidarity of the far flung British Empire is much more dependent on Anglo-American relations of many kinds than is our comparatively compact country.

It should be patent that the United States is therefore in a position to exercise considerable though perhaps indirect influence in European affairs even without control of transportation across the Atlantic. If our statecraft be positive rather than negative in that quarter, we should be able to secure reasonable regard for our policies and interests at least from the nations of Western Europe.

But when we look across the Pacific the situation is quite different and far more complex. For in Eastern Asia there are sev-

eral civilizations so utterly alien to ours that it is almost impossible for us really to understand them; there many European and American factors meet and require appreciation of their own origins—and there is nothing approaching a balance of power controllable with minimum effort. Furthermore, and quite the contrary to the most powerful Asiatic nation having interests in America that might serve us as hostages, it is the United States that has possessions in Eastern Asia. Nor should we forget that already a quarter of our overseas trade is transpacific, that it is growing more rapidly in that direction than in any other, that from there we get some of our most essential materials, and that there is the great undeveloped market for our manufactures.

Given the probability that it will be many decades before China can hope to become a positive power, competent to serve as a counterpoise in Eastern Asia, there remains Russia. But for the United States to look to Russia across the Pacific might involve an alinement diametrically opposite to that across the Atlantic. And furthermore, the bare possibility of a more or less transitory combination between Japan, Russia, and Germany cannot be ignored; for it should be remembered that Germany is in the bilateral position of retaining her agreements of Rapallo while undertaking those of Locarno. Nor should we forget that a strong Japan may be a deterrent to Russian aggression in Europe—a consideration much more important to some European countries than their particular interests east of Singapore. Indeed, it is well known that certain powerful European interests look to a strong Japan as a possible means of reducing the United States to such an extent that Europe might recover its ante-bellum preeminence in trade as well as in world affairs.

In short, as has been the case for centuries with England *vis-a-vis* Continental Europe, it is to the interest of the United States that across both the Atlantic and the Pacific, as well as in Latin America when the time comes, there should be such checks and balances that our influence on either side of the scale, as occasion may suggest, will produce the results desired with the minimum of effort on our part—and this quite the contrary to the fallacious view of some to the effect that maximum solidarity in other parts of the world is necessarily to the interest of the United States. But however that may be, if we recall the exceedingly delicate balance that exists in Europe and the fact that Western

European power must travel over 10,000 miles to reach the focus of force in Eastern Asia, it seems clear that responsibility for the maintenance of peace and respect for such interests and policies as ours in the Orient rests fundamentally on the ability of the United States to support our position there with such obvious firmness that it will not be questioned.

Here it is well to recall that 2,500 years ago, Sun-tzu, the Chinese sage and war lord, said that "to fight and conquer one hundred times is not the perfection of attainment, for the supreme art is to subdue the enemy without fighting." Yet such a happily bloodless outcome of war rests upon confronting an enemy in the field with such a disposition of forces that resistance would obviously be futile and the ignominy of yielding in war must be accepted. There is, however, a much higher criterion of accomplishment, which is so to support one's aims that they will be accepted peacefully, without arousing the passions or occasioning the wastes of war. And for a country circumstanced as the United States ever to be drawn into war connotes the failure of its leaders to recognize and secure the conditions essential to the maintenance of predetermined policies and to the safeguarding of established interests peacefully.

But as Sun-tzu's bloodless victory resulted from outgeneraling the enemy in the field, so the higher attainment of securing one's ends peacefully necessitates an understanding of how to confront an opponent who might become an enemy with such potentialities that he will abstain from war. More specifically, the particular problem that confronts our leaders—and us—is whether we could transport such a measure of our power to the critical Asian area and maintain it there under war conditions. If so, we can maintain peace, but otherwise there is no assurance. An outline of the elements of warfare, or more particularly, of transoceanic war, and an appraisal of our forces in that light should give us a fairly definite answer to the general problem and, incidentally, to the aircraft question of which we are hearing so much.

V

Any consideration of the principles of war should distinguish between what Clausewitz designated as "unlimited" and "limited" warfare. "Unlimited" war aims at the complete overthrow of the

enemy in his home country and consequently arouses his utmost resistance. By contrast, "limited" warfare seeks merely to obtain some dependency, concession, or other "limited" object while it abstains from any really serious threat to overwhelm the enemy's home country; so his combativeness is not aroused to the utmost and he is the more likely to yield the "limited" concession rather than continue the war.

There is great importance in the fact that in a war between the United States and an Asiatic power the latter's aims would seem distinctly "limited" to many Americans, whereas, in order to maintain our position in Asiatic affairs, we might have to aim at the "unlimited" reduction of the enemy's country, though not necessarily by invasion in force. In other words, the geographic distribution of interests is such that the inauguration of a "limited" war by an Asiatic power would be likely to compel us to carry through an "unlimited" war to victory as the only alternative to accepting defeat. Consequently, the enemy's combativeness would be aroused to the utmost while some among us probably would rather yield than continue the war.

Whether in "limited" or "unlimited" war, whether by sea, land, or air, the object of all warlike operations is to bring about such conditions *in the enemy's country* that he will cease from seeking the ends for which he went to war or will yield those for which war was inaugurated against him; and, at the same time, one attempts to parry such efforts of the enemy against one's own country. But naval operations proper are virtually restricted to sea areas. So they seek to produce such results in the enemy's country, in the main, by depriving him of the use of the sea as a channel for his combatant and commercial movements, while assuring as extensive use of sea communications as may be needed for one's own maritime transportation of all kinds.

Such exercise of what is technically known as the "control" of military and mercantile transportation by sea is the ultimate naval operation toward the success of which virtually all others look. It is carried out nowadays, in the main, by battle cruisers, heavy and light cruisers, submarines, and aircraft conducting dispersed cruising warfare. And while "control" operations include protecting commercial and military shipping, their main mission is to locate and stop enemy shipping—a task in which airplanes, operat-

ing from naval vessels, can be exceedingly helpful by making high speed flights of a few hundred miles and thus greatly extending the sea area over which each warship can exercise effective "control."

It should be realized, however, that aircraft alone could not fulfill the humanitarian requirements before sinking a ship that submarines can. Furthermore, the radii of operation in the transoceanic undertakings with which we are concerned are far beyond the serviceable limits of aircraft, obliging the latter to be carried to the approximate scene of activities and there supported by naval vessels. And however great a part aircraft come to play, their main aim at sea will continue to be the "control" of seaborne traffic because ships unquestionably will remain the principal means of carriage over the seas—for it would take about 4,000,000 trips a year of the largest airships now practicable to conduct the overseas commerce now tranported for us by surface vessels in less than 10,000 trips.

Cruising "control" operations logically will seek to deprive the enemy of the use of whatever sea area may be most essential to his purposes—will strike at the root where his sea communications concentrate rather than snip at far flung twigs. But the enemy's aim will be to defend an area so vital to him by a concentration of his naval power in a battle fleet so based as to "command" his critical area in order to debar dispersed cruising vessels from effectively controlling traffic in it. Consequently, the enemy's battle fleet must be overcome—or contained near its base by the continued presence, in his critical area, of an obviously superior battle fleet of one's own—before the ultimate "control" operations of patrolling the enemy's critical area and blockading his access to the sea can be carried out with maximum disastrous effect upon the military, economic, social, and political conditions ashore in his country.

Conclusive naval operations therefore call for three elements: a base so located that the fleet can maintain superior force in the enemy's critical area; a concentrated and preponderant battle fleet of capital ships and their auxiliary vessels and aircraft of all types, the task of which is to secure "command" of the enemy's critical area so that the "control force" can operate effectively therein; and *in addition,* a dispersed cruising "control force," con-

sisting principally of cruisers, submarines, and aircraft, the task of which is to exercise conclusive "control" over all kinds of maritime transportation, in the critical sea area most important to the enemy, as well as elsewhere.

Operations against capital ships, as in a great battle, may captivate public attention and be acclaimed as a conclusive victory. But to the initiated such concentrated contests are but the struggles necessary before "command" can be secured over the critical area in order thereupon to exercise effective "control" in it by dispersed cruising, which latter is the conclusive maritime operation. And while almost all types of naval vessels and aircraft are used in the performance of both tasks, a nation's fleet is not balanced and adequate if it does not contain enough vessels of all types to execute both tasks wherever they may become necessary.

As between aircraft and naval vessels, the question is not whether the former can or cannot sink a battleship under more or less favorable conditions. For many decades small surface or submarine vessels bearing torpedoes admittedly have been able to do this, if permitted within effective range. But battleships have survived because, in addition to such protective construction as many watertight compartments and layers of plating, their rapid fire auxiliary batteries and screens of destroyers usually keep such attacking vessels beyond effective range. Similarly, the long range, rapid fire, anti-aircraft guns of a battleship force aircraft to bomb from such a great height that effective aim is difficult and, what is more important, high speed combat planes, acting as aerial screening vessels, have become essential and promise to be effective in shooting down the necessarily less agile bombers and torpedo-planes. And just as a screen of surface vessels must be strong enough to prevent its being driven in and the battleships torpedoed, so the defensive aerial screening forces must be sufficiently strong to withstand attempts by offensive enemy combat planes to drive them down preparatory to an attack by bombers.

It is hardly necessary to add that, besides such defensive duties, scouting planes extend a fleet's vision by hundreds of miles, their observers being, of necessity, trained naval officers; and gunnery spotting planes about double the effective range of fire of a battle fleet, the spotter miles away and up in a plane being, in effect, as important an element of a gun's crew as is its gun layer.

In short, it cannot be too clearly realized that present day naval operations involve the securing of "command" of critical areas across the oceans from our shores in order to exercise "control" over them; and such operations require the transport to those areas of hundreds of thousands and even millions of tons of military supplies before "command" could be secured and "control" exercised conclusively by an effective blockade lasting many months. There is no present prospect that aircraft alone could operate thus across the oceans without the support of naval vessels. There is, however, every prospect that they will be not only very helpful but absolutely essential auxiliaries to naval vessels in such transoceanic operations. But to be effective auxiliaries, they must be designed, organized, trained, and fought as a part of the naval fleet, under unity of command.

VI

This outline of the principal elements in naval warfare may have indicated how naval power can fulfill its real mission, which is not merely to win in war, but to be so manifestly able to uphold the tenets of advancing civilization that the outrage of war against them will not occur in regions where the regard accorded them is somewhat proportional to the potentialities of the force supporting them. It may also have suggested why a certain naval power seems so keen to make transoceanic war between us physically impossible—so that the influence of American naval power could not be extended across the oceans to support our interests and policies where they may most need it. And the distinction made above between the concentrated battle fleet to secure "command" over the critical area and the dispersed cruising force thereupon to exercise "control" over it gives us a way of forming a general estimate as to the adequacy of the present American fleet.

We may assume here, without commitment, that in proposing a limitation of virtually all types of combatant vessels in the ratio of 5-5-3 between the United States, the British Empire, and the Japanese Empire at the Washington Conference, the American delegates properly safeguarded our interests. But the limitation of only capital ships and aircraft carriers was agreed to; and this only upon our acceptance of the Japanese proposal, supported by the British, that Pacific insular fortifications and naval bases west

of the Hawaiian Islands, and other than in Japan proper and Australasia, be not strengthened.

Agreement to this Japanese stipulation may seem to have deprived us of the first requisite to naval power, a base from which "command" over the critical area can be secured. On the other hand, when looking over the several fortifications at the entrance to Manila Bay soon after the Conference, an unquestionable authority described them to the present writer as being "incomparably stronger than Gallipoli." If adequately manned, munitioned, and supplied, they would be impregnable for considerable time against any sea, land, or air force that could be brought against them. Our fleet would have for some time, therefore, a secure haven of refuge and refit for further operations in the Western Pacific. But unless relieved in due time, these fortifications would eventually fall. So the vital question is whether our fleet is in such shape that it could reach Manila Bay soon after the outbreak of war. For if not, one or more years would be added unnecessarily to the duration of the war before our fleet could establish itself securely in the Western Pacific preparatory to the operations it should have inaugurated from Manila Bay.

The following table schedules the principal constituents of the American, British, and Japanese fleets that are built, are building, or for which appropriations have been made.

	United States	British Empire	Japanese Empire
Capital Ships	18	20*	10
First Line Aircraft Carriers	2	4	2
Modern Cruisers	12	51	25
Destroyer Types	289	203	104
Large Submarines	6	9	23

* After completion of replacements now being made.

As the battle fleet is the force required initially to secure "command," we should first deduct from the above schedules the capital

ships, aircraft carriers, and other auxiliaries necessary to it; and thus we may form some general idea of what auxiliaries would be left over for the conclusive "control" work and such other operations as convoying. Naturally, however, if one battle fleet were virtually to destroy another, such of the victor's battle-fleet auxiliaries as survived might become available for "control" and similar work. But if the stronger fleet were merely to contain the other close to the latter's base without destroying it—as in all probability would long be the situation in the Western Pacific—then the containing battle fleet must be kept up with virtually full quotas and could not contribute many auxiliaries to "control" work.

The following table shows the auxiliaries that would be left for all tasks outside the battle fleet if, in the latter, we allow at least one cruiser, five screening destroyers, and one fleet submarine for each capital ship and aircraft carrier.

	United States	British Empire	Japanese Empire
Modern Cruisers	Minus 8	27	13
Destroyer Types	189	83	44
Large Submarines	Minus 14	Minus 15	11

Apparently the British have twenty-seven modern cruisers available for "control" operations and the Japanese thirteen whereas we not only have no such cruisers available for that kind of work but even lack eight cruisers for our battle fleet. Incidentally, it may be well to recall that the reason often given for England's maintaining a fleet of fifty-one modern cruisers, and adding to it, is that they are necessary to the safety of her far flung commerce. But as our own external trade is as great as hers, and our exports greater, and as this trade of ours flows to every port in the world to which hers goes, it is difficult to see why, on the score of commerce protection, we do not need as large a fleet of cruisers as hers.

While we are so deficient in cruisers, we seem to have a preponderance in destroyers, built hastily to overcome the German submarines and which, consequently, will be obsolete about seven years hence. But if hostilities were to break out during their use-

ful life, many of them would be used for offensive tasks with the battle fleet that are beyond the scope of this paper. And furthermore, it would evidently be utterly illusory to expect 1,200-ton destroyers, of comparatively short operating radius, to do such extensive "control" work as that for which England and Japan are building 10,000-ton cruisers.

As to large submarines, we lack fourteen and the British fifteen for our respective battle fleets whereas the Japanese have a surplus of eleven available for "control" work and some of which are capable of crossing the Pacific, operating off our coast, and returning to Japan without refueling.

In short, judging our fleet by those of England and Japan—the only two nations, according to the British authority, Gerard Fiennes, that proportion their naval power to the tasks it may have to perform—we not only have no effective "control force" in addition to the requirements of our battle fleet, but even the battle fleet lacks eight cruisers and fourteen fleet submarines. That is to say, our battle fleet itself is so deficient that grave doubts are raised as to its ability to proceed with reasonable safety to Manila Bay, or to any remote base in time of war, in order to secure the "command" over such a critical area that, of necessity, is the preliminary to the conclusive "control" operations therein, whereby naval power engenders in an enemy country the conditions that compel collapse.

While these matters may be obscure to some of the comparative amateurs in international grand strategy who control our naval policy, they are beyond doubt patent to the professionals of other nations. And from this it follows that it is obvious to others that American naval power is not now capable of giving such support to our policies that they must be respected and peace be maintained; nor is it adequate to safeguard our overseas possessions, trade, and other interests which together already amount to over a tenth of our total national wealth, and upon which our welfare and security at home are so increasingly dependent.

VII

In view of the conclusion just reached, it may serve a proper purpose to recall briefly how the Navy of the opulent United States has come to such a pass while comparatively straitened

England and Japan have each greatly expanded their auxiliary forces since the Washington Conference limited capital ships.

As has been said, the bed-rock American proposal at the Conference—which some held went far below the requirements of safety—called for the limitation of virtually all classes of fighting ships in the ratio of 5-5-3. But as we secured the limitation only of capital ships and carriers, safety required that we match the fleets of the other powers, according to the treaty ratio, in the unlimited classes. Consequently, after his experiences at the Conference, ex-Secretary Hughes said: "It is essential that we should maintain the relative naval strength of the United States. That, in my judgment, is the way to peace and security." The General Board of the Navy had no alternative but to recommend that the Navy be brought up to the treaty ratio in every essential; and its policy was officially approved.

But emotionalism over the Conference was in the saddle—and besides, partisan politics required that the alleged success of the Conference be proven to the public in dollars. So Congress pared appropriations from $400,000,000 a year down to about $300,000,000 and refused to authorize new vessels although, almost ever since the Conference, naval authorities have been insisting that an additional $100,000,000 a year must be spent if our Navy is to be brought up to the treaty ratio and kept there. The saving has been the result of deliberately keeping our Navy below the treaty ratio in vital respects rather than of limitation.

It was not long, however, before the course pursued by other parties to the treaty dissipated the fancies of some that the Conference had ended naval competition. For instance, in spite of their present great preponderance in cruisers, the British cruiser building program calls for the expenditure of $340,000,000 during the coming five years while the Japanese are considering new vessels estimated to cost fully $145,000,000. So it is not surprising that during the last two years a movement has developed in Congress to increase naval appropriations, not in order to match our vast resources against the lesser means of others so as to excel, but merely to follow up and equal, step by step, such competitive building as has been and may be inaugurated by others.

But during these last two years the administration has not looked favorably on this congressional move to "maintain the relative

naval strength of the United States." On the contrary, and although relative strength is the essence of the treaty, the administration has decried comparisons with other treaty navies—for such comparisons militate against the program of economy before all else. The position seems less tenable than that of a man who reduces his operating expenses by cutting down his life and fire insurance; for they pay benefits only against loss incurred, whereas the Navy, if adequate, insures that the nation shall live and that its interests shall not be ravaged by the fire of war.

Confronted by cold calculations showing that about $100,000,000 more a year should be spent to bring our Navy up to the treaty ratio in auxiliaries, the seemingly happy thought of calling another conference to limit auxiliaries was conceived. The first Conference had been a political success; therefore, call another. But this overlooked the fact that the tremendous preponderance we had in capital ships before the Conference was what brought certain powers to it; and this preponderance was what enabled us to get others to limit their capital ships by ourselves offering to make greater sacrifices than we asked of them. Yet in spite of this former preponderance, we were then unable to bring the other powers to agree to limit their auxiliaries.

Now, however, we have no preponderance in capital ships and we are far inferior to both Britain and Japan in cruisers and other vital auxiliaries. Not only have we no obvious means of bringing others to a conference on auxiliaries, but were we to call one we would be in the position of inviting them to make greater reductions than we could possibly make, and this in order to save our bulging purse from such expenses as their wisdom tells them they must eke out. Yet, undoubtedly, both Britain and Japan would gladly attend a conference committed to limiting auxiliaries on the present status quo, which might allow the United States, say, not over a third of the British auxiliary strength or more than half that of the Japanese. Under such circumstances, or with such prospects, it is difficult to see how even the utmost frugality in finances would lead us into a conference for the limitation of auxiliaries.

As indicated above, the alternative is to build our Navy up, step by step, in accordance with the treaty ratio, as the other parties to it build theirs. Recently published official figures show that

there are required 4,000 more officers and 20,000 more men, two more aircraft carriers, twenty-two more 10,000-ton cruisers, twenty-six more large submarines to bring our fleet up to the treaty ratio merely in these respects—and there are other requirements. There is no call to exceed any of these minimum requirements for safety. But failure on the part of the administration to urge their authorization and failure of Congress to make adequate appropriations for them would be to side-step the facts and deliberately keep our Navy below the minimum relative strength considered safe by the most optimistic at the Washington Conference.

It is easy to decry so-called "militarism" and to flout professional opinion, as Wilson did. Then the result was that our interests were outraged and we were forced to fight, though comparatively unprepared, whereas adequate preparedness against the event of war surely would have given such weight to our diplomacy that our interests would have been respected and our peace policy accepted without the appalling waste of our actual participation in the war.

Today we see powers, expert in such matters, straining their comparatively limited resources, not to live up to the naval treaty, but to multiply the preponderance they already have over us. The covert threat to our world-wide interests—upon which we are so increasingly dependent—should be manifest. A rich and really powerful nation that insists on the peaceful recognition of proper policies can be the greatest factor in the world for the maintenance of peace. For it to be practical in doing so is not only a national but a world responsibility. But for the most affluent and envied people on earth to leave such vast interests as ours inadequately protected is to offer to others a temptation that, in effect, is a menace to the peace of the world. Furthermore, this menace is intensified by the obvious prospect that if the United States could be involved in a long drawn out war, then at least one other power might seize the occasion created to regain such a position as it enjoyed in trade and world affairs before the late war. And thereupon it would be able to exercise the balance of power, actively or potentially through its armaments, so as to dictate peace when and as might best suit its own interests.

That parsimony may force upon us another such orgy of war and waste as pacifism did but a few years ago is a sufficiently seri-

ous prospect. But then the circumstances of others enabled the United States to come out of the late war as potentially the premier power. The present prospect is, however, that our niggardly neglect to maintain our proportionate naval power not only invites war but invites a war that an experienced neutral might use to regain from us the future leadership of the world. Is not the safeguarding against such contingencies of more importance than the "economy" of $100,000,000 a year—especially when we recall that such an amount is but a minor fraction of our latest federal surplus?

THE NAVAL STAFF AFLOAT

By Captain B. B. Wygant, U. S. Navy

IT IS a failing of human nature that the necessities of a new situation are never thoroughly grasped until the new situation is actually at hand. Ordinarily we are unable to appreciate the demands of new conditions until these demands become insistent. With particular regard to the subject of this article it is believed that, as a whole, the Navy has failed to realize the immensity of the demands that a naval war with a first-rate power will make upon the machinery of staff organization, and more especially upon that of the commander-in-chief and his subordinates afloat. Naturally, one cannot give mathematical expression to the increase of war-time demands over peace-time demands, but certainly it will be tenfold. It is only necessary to contemplate the great increases that took place in the Navy in the last war to realize, very inadequately, the increases that are probable in the next, for in the next war the Navy must be prepared to exert its power to the utmost instead of being occupied with subsidiary efforts as in the last. We must count upon having to carry on a war single-handed against an enemy that is fresh instead of partly exhausted by three years of previous effort.

The fact at issue is not, of course, whether present staff organization is sufficient to take care of the added demands incident to war operations. It is assumed that this condition, for practical reasons, could not be maintained in time of peace. The real question is whether the organization at present in effect will permit the needful expansion in a smooth and efficient manner so that the expanded organization will properly conduct its functions in bringing the war to a successful conclusion.

Such is not believed to be the case, and for clearness of exposition the reasons for this mistrust will first be stated, and then effort will be made to prove the soundness of these reasons.

1. There does not exist in our service a well defined and generally accepted conception of the functions of command, together

with a staff organization based on this conception, such as exists in most, if not all, the big military organizations of the world.

2. There is no standard basic organization that applies to all staffs and staff work. This lack of standardization entails unnecessary difficulties in the exercise of command and is fatal to the best results.

The organization of the staff of a flag officer afloat is treated in a very general way only by the Navy Regulations. The important provisions for the purposes of this discussion are as follows:

Art. 785 (4)—The chief of staff will supervise and be responsible for the work of the various divisions of the staff. All officers of the staff are subject to the orders of the chief of staff in all matters pertaining to staff duty.

Art. 786 (1)—The staff of a commander in chief will be organized into an operations division and such other divisions as may be prescribed by the department or found necessary by the commander in chief for the proper administration and operation of the fleet during peace and war.

(2)—The assistant chief of staff will be the chief of the operations division. The commander in chief will appoint the chiefs of the other divisions from among the officers ordered to duty on his staff.

(3)—The chief of each division will supervise and be responsible for the work of his division.

(4)—The divisions of the staff will be organized by the commander-in-chief and the officers assigned to duty on the staff will be distributed among them so as to administer and operate the fleet to best advantage.

Art. 788. The staff of a flag officer not in chief command will consist of a flag lieutenant and a flag secretary, to be nominated by the flag officer on whose vessel they are to serve, and of such aids and additional officers as the Navy Department may detail. The organization and duties of the staff of a flag officer not in chief command will correspond as far as practicable to the organization herein described for a commander in chief.

Consideration of these provisions of the regulations indicates not only that a standard organization is not required, but, with the exception of the formation of the "Operations Division," no standard is set forth, and naturally no great similarity will exist. It is believed to be plainly evident that the degree in which any staff differs from the normal standard organization (using that term to mean the organization suited to war conditions) should be determined solely by the circumstances of the case and not by the heterogeneous opinions of individual flag officers, however able they may be.

The following tabulation lists the titles of officers on the staffs of:

The Commander-in-Chief, United States Fleet,
The Commander-in-Chief, Battle Fleet,
The Commander, Battleship Divisions,
The Commander, Scouting Fleet,
A Division Commander, Battleship Divisions,

and is that existing in May, 1925:

Title	Staff of				
	C-i-C U. S. Flt.	C-i-C Bat. Flt.	Comdr. Bat. Divs.	Comdr. Sctg. Flt.	Div. Com. Bat. Divs.
Chief of Staff	1	1	1	1	
Asst. Chief of Staff		1			
Flag Secretary	1	1	1	1	1
Flag Lieutenant	1	1	1	1	1
Ops. Officer				1	
Personnel Off.		1			
Material Off.	1				
Fleet Training	1				
Supply	1	1		1	
Radio	1	1	1	1	1
Communications			1	1	1
Aviation	1	1		1	1
Gunnery		1	1	1	
Engineering		1	1	1	
Surgeon		1		1	
Constructor		1			
Marine	1	1	1	1	1
Chaplain		1		1	
Asst. Commun.	6	9	2	1	
Aide (Sic)			1		
Totals	15	23	11	14	6

In the above written tabulation, allowance has to be made for variation in titles. For example, an officer listed in the roster as "aide—fleet athletic, personnel, patrol, and morale officer"—has been placed under the name of "personnel officer," while another listed as "aide—fleet aviation activities and ship movements"—has been placed under "Aviation" rather than "Operations." Also, paymasters and supply officers have been grouped under the name of "Supply."

Even a passing glance at this table indicates, by reason of the actual titles used, lack of a division into functional branches and, moreover, there is no basic organization evident that would apply to all staffs. It will be noted that there are only four titles common to all of these staffs, namely, flag lieutenant, flag secretary, marine and radio. Now, of course, it is not suggested that the staffs of the flag officers mentioned should be the same, since the duties performed are not the same, as is the case with the various army corps of a field army or with the various divisions of an army corps, but it *is* believed that the framework should be similar and that the titles should in some degree indicate the place in the framework.

Let us examine in a very general way the staff organization that exists or has existed in other large military organizations:

Our Army, in the authoritative treatises on the subject, divides command functions into two general classes, one class being those duties that a commander cannot delegate to others, and the other class being those duties which, owing to the limitations of human nature, have to be, and normally are delegated to the staff. These delegated duties are divided into the following functional classes: (1) Personnel, (2) Intelligence, (3) Operations and Training, and (4) Logistics. Aside from these divisions of the "General Staff" there is the "Technical and Administrative Staff" which is distinct from the General Staff, but the members of which work under the Chief of Staff and the heads of the four sections. This basic organization exists not only in the staffs of divisions, corps, and armies, but also, with additions, is carried into the War Department itself. Its adoption was the result of study and deliberate choice and was brought about by congressional legislation.

The French system briefly is to divide what may be called the operational staff into three bureaus: (1) Organization, (2) Information, (3) Operations; which is a functional division, and to organize the "services" as entirely separate. Services may be defined as those activities which are concerned with supply, repair, upkeep, and so forth. They look out for the subjective as opposed to the objective needs of the unit.

The peculiar situation of Germany before the war required an extremely elastic organization, as does our own situation at the present time. The military organization in Berlin was not duplicated in the organization of the unit staffs. The Great General

Staff, for example, had not only a functional separation, but also to some extent a regional one, that is, one section of the Great General Staff was charged with information regarding and plans concerning the Eastern front, while a different section of the staff performed the same duties with regard to the West. In general, the General Staff was looked upon as the means for converting the will of the commander into orders and for exercising supervision over the military efficiency and material welfare of the troops, and was assisted by the "services" which included personnel and supply matters, and the "Technical Staff" which included the artillery, signal and pioneer branches.

In the British Army the staff is divided into three branches; (1) General Staff, (2) Adjutant General's Branch, (3) Quartermaster General's Branch, while in the British Navy there is a division into Operation and Administration. It is specified in the British Navy Regulations that:

> Staff officers are in two categories:—
>
> (a) Those who assist the command in the preparation for, and conduct of, the operations of war. These are entitled "War Staff Officers."
>
> (b) Those who assist the command in its technical and administrative functions. These are entitled "Technical and Administrative Staff Officers."

Owing partly to the difficulties of language, the structure of the Japanese staff is imperfectly known, but enough evidence has been cited to indicate that elsewhere than in our Navy there exists a pretty clear idea of command functions, and that in the staff organizations these functions have been pretty generally recognized.

In proposing or recommending an appropriate staff organization for the higher flag officers afloat, consideration must be given to three things—the American temperament, naval traditions, and the probable opponents. Any scheme selected must be adapted to our habits, must conform to our traditions, and must be chosen with a view to facilitating the conduct of war in probable areas. A difficulty also lies in the fact that staff organization is intimately connected with the operational and administrative organization of the fleet and of the Navy Department. However, since this discussion is restricted to the consideration of the naval staff afloat, the limitations imposed by the situation must be accepted.

The mission of the staff of a flag officer may be expressed in these words: "To assist the commander in the exercise of the functions of command." Before proceeding further, however, let us ask two questions, upon the correct answers to which depend the soundness of our conclusions:

1. What is command?
2. What are the functions of command?

In answering these questions we can, for reasons which will appear more clearly later on, use the parallel of the living organism as representing a fighting organization. With this in view, "command" may be said to reside in the mind (the commander and his staff), while "force" resides in the body (the fleet). *Command includes the processes whereby the will of the commander is formulated and communicated to his subordinates,* or, stated in other words, it may be said to embrace those actions and reactions whereby the environment is appreciated and the necessary measures decided upon and transmitted to appropriate members of the organism for putting into effect. Now if to the above described sequence of actions we add that process which has for its object the sustaining of life, that is the process of obtaining and assimilating sustenance, we have exhausted the list of the immediate and fundamental demands of individual existence. Since every activity that is needful for the life of an organism has its counterpart in the requirements of a fighting organization, it now becomes plain why the parallel adopted is so apt. A living organism and a fighting organization are simply different entities constituted and fitted for the purpose of conducting the struggle for existence.

To follow the simile a bit further, we find that the business of conducting the struggle, that is, of fighting, requires the operation of these functions:

1. A realization of surrounding conditions.
2. The transmitting of external sensations to the central intelligence.
3. The evaluation of external sensations (information) in conjunction with known conditions.
4. Deciding upon the appropriate reactions.
5. Communicating the decisions to the external members for putting into effect.

6. Putting the decisions into effect (fighting).
7. Estimating the amount of needful supplies.
8. Obtaining the supplies.

A consideration of this list shows that certain of these activities are "mind" functions, which may be called command functions. Others are "body" functions or those of forces. Thus numbers 1, 2, 3, 4, 5, and 7 should be performed by the thinking part of the organization, while numbers 6 and 8, though "body" functions, are performed by entirely separate members.

We are at present particularly concerned with the mind or command functions enumerated above. Upon further consideration it becomes evident that numbers 1, 2, and 5 have a basic relationship and may be grouped together. Changing to military phraseology, it would appear that the obtaining of information, its transmission and the transmission of orders may conveniently and logically be included in a single division of a staff organization which we shall call "Information."

The activities embraced in number 3 above may be translated in military terms as "estimating the situation," and there should be added plan making and order writing to the duties of a second division of the staff which we shall call "Operations." In this division should be placed organization and training as well, since they both are means adopted to perfect operations.

Number 7 above has to do with logistic plans and policies and should be included in a division of the command staff distinct from that called "Information" and that called "Operations." The actual transportation and distribution of supplies is a force function, however, and would be performed by the train as at present. In designating a Maintenance Division for the logistic function we are confronted with the question as to whether or not to include personnel with supply.

In the Navy, men and materials must be transported in the same kind—often the same—carriers, which are ships. Now, although in our Army there is a separate part of the staff which is charged with personnel matters, this is because the Army must think in terms of man-power, while in the Navy we think in terms of "ship" power. Again, the Army can be expanded (within the limits of available arms and equipment) indefinitely as long as there are men to fill new units, whereas in the Navy,

expansion is limited by the number and size of the platforms upon which the men must live and fight, that is—ships. It would appear therefore that we are justified in including personnel in a Maintenance Division of the Command Staff.

The most important in the list of command functions is No. 4, above, that of "Decision." This is a function which cannot be delegated. It belongs to the commander, and its exercise insures to the commander absolute "headship." It is in order that the commander's mind shall be free of other details for the exercise of decision that the staff exists.

There are thus three divisions of what may be called the "Command Staff" whose duties, be it emphasized, require them to formulate policies and plans and supervise the execution thereof but *involve no actual command of forces.* The commander, the chief of staff, and this command staff taken together may be called "the Command." In addition to this it is apparent that there are many branches of naval activity which must have specialist representatives available for consultation by the members of the command staff in their duty of assisting the commander in performing the functions of command. The members of this body, which may be called the Technical Staff, will vary in accordance with the introduction and development of new weapons and means for conducting warfare. Likewise there are administrative duties that have to be performed, which require the presence of officers on the staff.

The duties of a personal staff in time of war would be performed by an officer or officers independent of the Command or Technical and Administrative Staffs, but in time of peace could probably be combined with other duties.

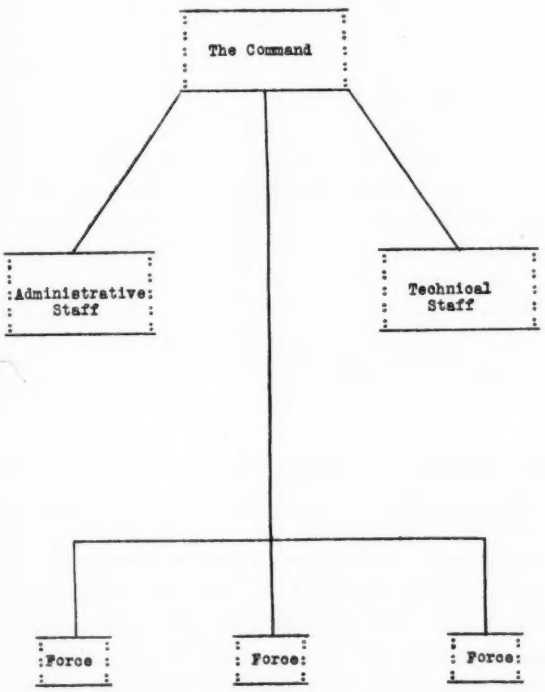
It will readily be seen that however great the desire to cooperate on the part of the three divisions outlined above, or on the part of officers of the Technical and Administrative Staffs, there will come times when a higher authority will have to decide between differing needs or differing demands; when, in fact, cooperation will not function and coordination must be resorted to on the part of the common superior. These differences ordinarily need not be brought to the attention of the commander himself, and here we have a need for a chief of staff, senior to all members of both staffs and part of whose duty would be to coordinate their efforts.

In order to present a clearer picture of the relations between the commander, his forces, and his staff, two illustrative diagrams have been drawn.

It will be noted that, in order to conform to the Army organization, the divisions have been numbered as follows:

First Division—Maintenance
Second Division—Information
Third Division—Operations

DIAGRAM ILLUSTRATING THE RELATIONS BETWEEN "THE COMMAND," "FORCES," AND THE TECHNICAL AND ADMINISTRATIVE ASSISTANTS



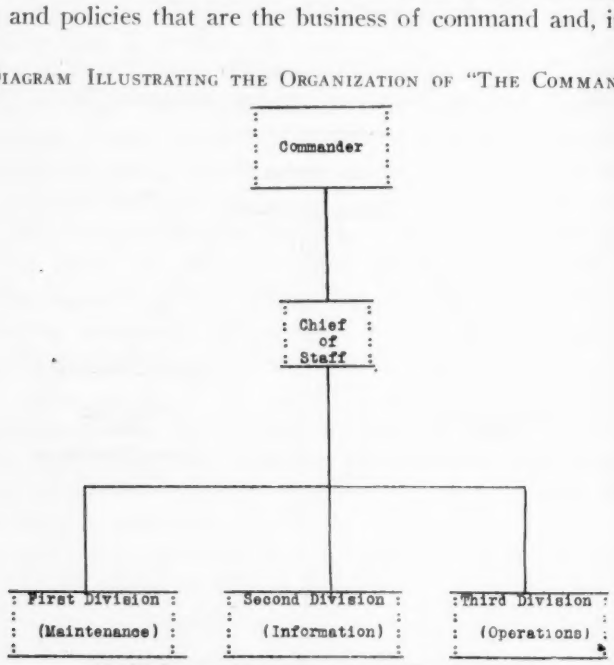
Will this scheme work?

In the first place it is desired to emphasize the fact that what has been outlined in a very general way is a *war time* staff organization, which can be reduced to a size commensurate with peace time activities by causing its members to double up in their duties. It is *not* a peace time organization that would have to be expanded

to meet the demands of war. It is easier to build a vessel of large size and then by appropriate means reduce its capacity, than to build one of small size and increase its capacity, and in exactly the same way it is easier to lay out an organization fitted for large activities and reduce these activities, than to expand an existing organization to fit new and unforeseen demands.

In the second place, owing to the fact that practically all staff work of an administrative or technical nature has its origin in plans and policies that are the business of command and, indeed,

DIAGRAM ILLUSTRATING THE ORGANIZATION OF "THE COMMAND"



involves the details of these plans and policies, there is provided a very definite and logical path whereby shrinkage may take place in the case of an adaptation to peace time requirements or in the case of fitting the organization to the necessities of small units. Thus in the staff of a small unit the administrative duties that have their basis in policies enunciated by the operations division would be performed by the operations officer of the staff, not because these duties resided in his office but because, owing to the lack of an officer detailed to assist the operations officer in an administrative or technical capacity, he—the operations officer—would have to perform the duties of someone else,

a blank file. Similarly in a small unit the maintenance officer might perform not only the planning entailed by the distribution of personnel and supplies, but also the actual administrative distribution. He would, in that case, be the personnel and supply officer in addition to being the head of the maintenance division.

Far from resulting in an enlargement of the personnel of staffs as at present constituted, the systematizing of work would, it is believed, tend to reduce present numbers. Indeed it is not too much to hope that a better conception of the duties of command would result in the clearer differentiation between operational (tactical) and administrative units of the fleet, with the consequent elimination altogether of much technical and administrative work from those units which are purely operational in character. This would result naturally in a smaller personnel.

Whether the outline set forth above is the best that can be conceived is of no consequence. It certainly is *not* the best. Objection can be held with good reason to many of its provisions. The thing that is important, however, is that officers of the service shall give thought and reflection to the questions herein suggested which have not received the attention that is their due, to the end that there shall be evolved some system which will adequately and smoothly function in the next war; when quickness in reacting to a situation may save a thousand lives, when the saving of a few minutes through good organization may mean the difference between victory and defeat.

SAVE THE "HARTFORD"

By Captain H. E. Yarnell, U. S. Navy

IN THE mud of the Cooper River, stripped of her rigging, a roof over her deck, lies, almost forgotten, the old sloop *Hartford*.

In England, Nelson's flagship has been a shrine for a century to the officers and men of the Royal Navy. Our *Victory* serves as a receiving ship in an obscure naval station.

History records no more daring battles than those where Farragut took his wooden walls past powerful shore batteries and over mine fields to victory.

How many millions of lives would have been saved the Allies had a Farragut commanded the naval forces at the Dardanelles in March, 1915?

The Straits would have been run, Constantinople captured, the *Goeben* sunk, we can rely on that.

And afterward, Russia relieved, Turkey out, also Bulgaria, it is quite probable that the war would have been shortened from one to two years.

Churchill's brilliant plan and his indomitable energy in pushing it came to naught for the want of one man who dared to do great things; and one hundred thousand men died to no purpose except to prove that bravery and endurance have no limits.

To the officers of the United States Navy, the life of Admiral Farragut is one of peculiar interest. Master of a prize and participant in a bloody naval engagement at the age of twelve, he spent the subsequent forty-seven years in an era of peace, with the brief exception of the Mexican War.

Promotion was slow; he was a commander at the age of forty and a captain at fifty-four. He was sixty when he was ordered to the Gulf Squadron and sailed on the *Hartford* to join his command in 1862.

During all this period, however, he retained his mental and physical energy and was ready for the supreme test of battle when the time came, although delayed nearly half a century.

Loyalty to his service and his country led him at the outbreak of the Civil War to sever the ties of southern birth and family, and cast his lot with the flag.

In the world of today where a spirit of unrest is abroad, and there is a strong tendency to throw old standards into the discard, it may be well to pause and consider.

By all means reject old traditions which serve no purpose, and hamper progress.

On the other hand, traditions which serve to exemplify loyalty, character, and professional ability are as necessary today to us in the Navy as they were a century ago.

In his life of Farragut, Mahan says:

"The acquirements of the accomplished officer may enable him to see the right thing to be done under given conditions, and yet fail to lift him to the height of due performance. It is in the strength of purpose, in the power of rapid decision, of instant action, and, if need be, of strenuous endurance through a period of danger or of responsibilitiy, when the terrifying alternatives of war are vibrating in the balance, that the power of a great captain mainly lies. It is in the courage to apply knowledge under conditions of exceptional danger; not merely to see the true direction for effort to take, but to dare to follow it, accepting all the risks and all the chances inseparable from war, facing all that defeat means in order thereby to secure victory if it may be had. It was upon these inborn moral qualities that reposed the conduct which led Farragut to fame."

Let us rescue his old flagship from the oblivion of a Carolina river, restore her to her original condition, and place her at Annapolis as an inspiration to our future officers.

Perhaps in days to come, some midshipman, through such an heroic association with the past, will be guided to victory by his memory of the admiral who dared and won against great odds.

He may be a second Farragut.

THE PHILIPPINE FIBER INDUSTRY

ITS CONNECTION WITH ALLIED PRODUCTIONS IN THE UNITED STATES; ITS DISCOVERY, GROWTH AND IN PARTICULAR ITS ADAPTION TO THE MANUFACTURE OF CORDAGE

By Commander G. R. Crapo, (SC) U. S. Navy

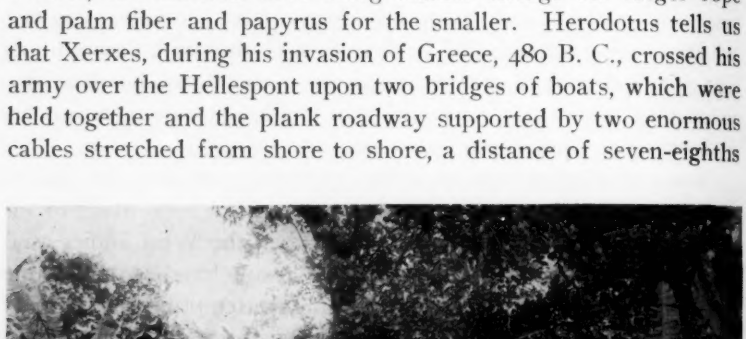
THE average person in a day's work will have exposed to his inspection a dozen articles of common every-day use that have a very picturesque and interesting history if inquired into. Walk down the water front of any seaport town and watch the shipping; take notice of the immense cables that secure the large vessels to the piers, the life lines, the boat falls, lead lines, and if a sailing vessel is in the harbor, note the maze of ropes of various sizes that constitute her standing and running gear. Have you ever watched a vessel belonging to the United Fruit Company discharging an immense cargo of bananas, and if you have, did it ever occur to you that the banana, a favorite fruit in all families in this country, was a first cousin to the immense hawsers that tied the ship up at the dock? Nevertheless, it is a fact, this relationship in the original state. The story of rope and cordage in general is one of decided interest to all and especially to one of a seafaring turn of mind; consequently one of interest to every naval officer. This is especially so in view of the fact that the manufacture of rope from abaca or Manila hemp is the result of an inquisitive turn of mind of an American naval officer, and as the result of this inquiry an enormous industry has sprung up that has become finally an integral and essential element in all sea-going endeavor, whether commercial or naval. In the days of a generation ago, the era of the sail, it was incumbent upon every one attached to a vessel, from the "skipper" down, to know rope, not in the extreme sense that at a glance one could tell the grade or grades of fiber by which fabricated, but familiar enough to be able to tell by feel and look whether this or that coil was the one that would perform a certain

piece of work the best. The use of steam did not eliminate rope from the sea by any means; it only curtailed its usage in certain particulars, but with the use of steam came mechanical appliances, steam winches for instance, instead of the old hand capstan, and even on modern sailing vessels many have "donkey engine" winches to hoist their sails; in other words, the old intimate touch and personal contact with rope has been eliminated by these devices until today rope on board ship has become more an article of equipment than a vital element.

Abaca or Manila hemp is a fiber growth peculiar to the Philippine Islands, and while repeated attempts have been made to introduce the plant into India, Borneo, Java, the West Indies, and other parts of the tropical world, the result has been the same in each and every instance—*failure*. In attempting to ascertain through the medium of old records when abaca or Manila hemp was first looked upon as having a potential commercial use, it is found that one Antonio Pigafetta, a companion of Magallanes in the discovery of the Philippines, quotes a fairly accurate description of plant and plant life in the Philippines, although he makes no mention of anything that can be identified with abaca. It is not until 1686 that we find an authoritative mention of abaca as having a possible commercial value, and that in a record given by an Englishman, Dampier, who lived in Mindanao, and who describes the plant "Banana Textoria" as a plant both edible and fiber producing. How much experimenting Dampier did, is not known, but undoubtedly he planted a seed of suggestion for its further possible usages. It was not until 1820 that any records show that the possibilities of this plant for commercial purposes were again taken up seriously, and then by Lieutenant John White of the United States Navy, who took a quantity of abaca back to Salem, Massachusetts.

Of course rope is older than any authentic records of events, beyond even the range of tradition. The North American Indians were expert rope makers and utilized the fiber of cotton, yucca, and agave (maguey or sisal). According to records from very reliable sources, not only were the ancient civilized nations accomplished rope makers, but savage tribes in all parts of the world for unknown thousands of years have been able to make cords and ropes from a great variety of materials, and the beauty of their workmanship in many instances is little short of marvelous. There

are cuts and illustrations in existence (some, I believe, in the Boston Museum) showing the Egyptian method of rope making in the time of Pharaoh, and which were taken from the tomb of Thebes, the material used being leather strings for larger rope and palm fiber and papyrus for the smaller. Herodotus tells us that Xerxes, during his invasion of Greece, 480 B. C., crossed his army over the Hellespont upon two bridges of boats, which were held together and the plank roadway supported by two enormous cables stretched from shore to shore, a distance of seven-eighths



Close View of Temporary Shed for Stripping Abaca
Albay Province

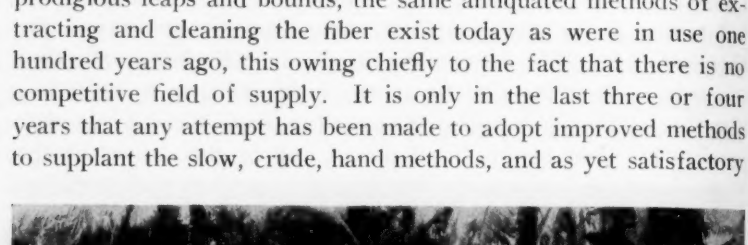
of a mile. It is said that these ropes were twenty-eight inches in circumference, two of each set being made of flax and papyrus. Coming down to something approaching the present and involving our own country, it is found that Boston in order to meet the needs of its shipbuilding and fishing industries, induced John Harrison, a ropemaker of Salisbury, England, to settle in Boston and set up his business in that village, where for years he (Harrison) had a monopoly of the local trade under paternal protection of the authorities. In 1794 there were fourteen ropewalks in and around Boston, and in 1810 there were 173 ropewalks scattered

over the country from Maine to Kentucky, but rope up to that time was made of fiber other than abaca (Manila hemp).

While history does not say so in so many words, it is believed that the small importation of abaca (Manila hemp) made by Lieutenant John White of the United States Navy started the ball rolling in the matter of converting abaca into fiber and the fiber into rope. The dates and records of events surely all point this way, considering that no record is in evidence to the effect that abaca (Manila hemp) had ever been used for rope (except possibly by hand for the local use of and by the natives of the Philippine Islands) prior to the small quantity carried to Salem by Lieutenant White. Moreover the records show that up to 1825 no abaca had ever been exported. We know that in 1825 practically nothing that could be called an industry along these lines existed in the Philippines; none was ever taken away until 1820, and then four years later a call comes for 276 tons in the United States. It certainly all points toward some one doing some extensive experimenting with the samples of Lieutenant John White, U. S. Navy, that proved valuable and resulted in the present extensive use of abaca (Manila hemp) almost to the exclusion of all other fiber for many of the kinds and sizes of rope now in use.

From the small exportation of 276 tons in 1825, its production, utilization, and exportation has increased at such an astonishing rate that in addition to the large quantities now used locally in the manufacture of rope, 830,000 bales or 115,370 tons were shipped out of the Philippine Islands in 1924 and practically all of this for the purpose of being converted into rope of various sizes and kinds. Please bear in mind that Dampier referred to this plant as "Banana Textoria," a natural mistake, but nevertheless a decided error in classification. Three plants exist there, that to the casual observer are almost identical. The common banana or musa sapientum, the plantin (musa pacadisiaca), and the abaca (musa textiles) all produce fiber but that of the abaca alone has any commercial value; the fruit of the abaca and the banana are similar in appearance, the banana, however, being edible, the abaca having no edible value. Then again the application of the term "hemp" to abaca is erroneous, as the fiber from the abaca is a structural fiber obtained from the leaf sheath, while the hemp is a bast fiber. True hemp is more closely associated

with jute than with abaca, but the misapplication of the term has been in use for so long the name "Manila hemp" is now generally accepted as being the fiber of the abaca plant. While the cultivation and production of abaca (Manila hemp) has increased by prodigious leaps and bounds, the same antiquated methods of extracting and cleaning the fiber exist today as were in use one hundred years ago, this owing chiefly to the fact that there is no competitive field of supply. It is only in the last three or four years that any attempt has been made to adopt improved methods to supplant the slow, crude, hand methods, and as yet satisfactory



Sun Drying Abaca Fibers

machinery has not been developed, consequently lack of efficiency and waste methods have kept the price of abaca (Manila hemp) higher than would have been the case if a large field of competition existed.

In the very beginning of the use of abaca for manufacture of cordage, little or no thought was given to the selection and grading of fiber, Manila hemp being Manila hemp and rope being rope; but with the rapid increase of machinery and diversified uses of cordage it was found that rope ceased to be merely rope, and demands began to pour in on manufacturers of cordage for a

special rope for this and a special rope for that; one call being for a rope that would withstand a tremendous strain, another wanting flexibility as the principal feature, another a spring line with a large elastic limit. In order to accomplish these ends and meet the ever increasing demand for special items of cordage, it became necessary to begin selecting and comparing strand fiber from various parts of the plant and also the product of different soils; in fact this item of investigation became so important that a fiber division was established under the Bureau of Agriculture, Philippine Islands, in 1915 for the purpose of conducting intelligently this research work, having in view the development of standard gradings of Manila hemp fiber, with a complete description of each grading, what best adapted for, strength, flexibility, color, and length of fiber, in order that buyers could gauge their purchases to suit their requirements. In this field the fibre division has done most excellent work in developing fiber up to its present standard, keeping up that standard, and constantly on the outlook for ways and means of producing a better fiber. This division now not only sets the standard grades of fiber with the attending requirements and specifications to be lived up to, but controls all inspections of same thus insuring the buyer receiving the grades he has paid for. At present there are thirty-one official gradings of abaca (Manila hemp) fiber ranging from AA—W, and the characteristics of each grade intelligently described and based on the following essentials: tensile strength, color, cleaning, length of fiber, texture of fiber.

As an illustration of the different grades, the standard tensile strength requirements are given as follows:

Grade	*Breaking strain per gram meter*	*Grade*	*Breaking strain per gram meter*
A	49,300	G	47,057
B	48,900	H	47,029
C	50,550	I	46,351
D	52,000	J	45,553
E	50,250	K	41,012
S_1	52,700	L	35,912
S_2	52,860	M	40,350
S_3	52,875	DZ	33,873
F	52,415	DM	30,472

There are other grades known as specials, indicated as double letter grades AA, BB, CC, DD, EE, but these grades are produced

only in very small quantities, pure white in color, extremely fine in texture and owing to the great care taken in cleaning, selecting and sometimes bleaching, they are placed on the market at a very high price, prohibitive to the cordage industry, and are unsuitable anyway as they have a lower breaking strain. The use of these grades is almost solely for tagal braid, cloth fabrications, and hats, almost the entire output going to Japan. In fact the grades A, B, C, and D are practically no longer used in cordage on account of their requirements, it taking over twice the labor to

Abaca Grading

strip and clean these grades as the S or streaky grades and lower; consequently a correspondingly higher price is asked, which in turn has affected the demand. As the producer obtains as much profit on the lower grades as on the higher with one half the labor, the production of these higher grades is falling off annually. Again there are the very low grades O—W, that are used only by manufacturers making the very cheapest ropes; these grades being almost purely what would be called in the United States "shoddy." In fact cordage utilization is confined mostly to the grades E to DM.

In talking with persons who in their daily work are in constant contact with rope, it is surprising how few (and naval officers are no exception) know anything about the basic raw material of Manila rope, the general understanding being that one grade of abaca (Manila hemp) is the product of one particular soil or district, and another grade from some other tree or plant grown under different conditions; whereas every plant, no matter where grown, strips from four to eight different grades. As an illustration, let us take three or four grades and see where they do come from. S3 is a standard grade, produced entirely from the outside sheaths, and these sheaths being weather exposed are naturally dark in color. S2, produced from sheaths next to those on the outside of the abaca stalk, and having more protection from the weather, is less dark in color. Thus from the extreme outside all the way through to the core are found the varying grades of abaca with their individual characteristics. The very fine or prime and extra fine or the As, Bs, and Cs are found on the interior sheaths immediately surrounding the core, and are pure white in color, soft in texture, but without the tensile strength or length of fibre of that extracted from the outside sheaths.

As in all plant life, the quality of the plant itself depends on the quality of soil in which grown, whether rich or poor. Consequently, the fiber extracted from the plant varies accordingly. Based upon this feature the abaca plants and the fiber extracted have gradually become known by the section from which produced, some sections producing medium grades, some poor, and some excellent. The product of the province of Davao, Mindanao, enjoys the well earned reputation of producing the best fiber in the Philippines and is frequently quoted as Davao Premium grade, bringing a slightly higher price in the market, grade for grade, on account of the demand for this quality.

An abaca plant matures in from twenty months to two and one-half years and a reset should be made on an average of every fifteen years, some varieties as often as twelve and others as infrequently as twenty years. In other words, an abaca tree is planted and from this root several shoots spring up of which one usually develops much more rapidly than the rest. This main shoot matures and is ready for cutting in from eighteen months to two and one-half years, depending on the fertility of the soil. After this first cutting it is a process of repeating, once in about

every six months a shoot being ready for cutting until the life of the plant is exhausted. In this connection it must be understood that generally speaking abaca is abaca, as a rose bush is a rose bush, but as there are many varieties of roses, so there are in the abaca plant family. As many as two dozen are recognized by the planters; however, only a few of these varieties are found in any one plantation, and the number of good fiber producing varieties is small; for instance, in Davao with ten known varieties only three are utilized for fiber purposes.

It is believed that a sufficient description of the abaca (Manila hemp) plant together with its characteristics and construction has been given to enable the reader to visualize hemp in the natural state, and if that has been accomplished then we are ready to harvest a small crop. As previously stated, at least 80 per cent of the hemp produced is extracted by very crude methods, and step by step the harvesting is as follows: The planter or his supervisor indicates the mature plants that are ready for cutting; after the mature crop has been marked, the cutters take the field each armed with a sharp-bladed knife called a "bolo." The stalk is cut at about six centimeters from the ground and on a slant, as, if cut horizontally, water will collect on the stump causing rot and injury to the root and remaining shoots. The work of fiber extraction should commence forty-eight hours after the cutting of the stalk and while full of sap or natural moisture and easily worked. The stalk being heavy and the crude fiber extracting apparatus light and easily transported, it is customary to move the latter from place to place and do the stripping at the place of the cutting. There are two distinct operations in the extraction of fiber; first, the removal of the ribbon-like strips of fiber from the leaf sheath, and second, the separation of the individual fibers by the pulling of these ribbons under a knife. The laborer sits on the ground with a stalk of abaca across his knees and inserts under the bark of one of the leaf sheaths a small sharp piece of bone called a "locnit" and pulls off a fibrous strip or ribbon, five-eighths centimeters wide and as long as the stalk; each sheath will yield two to four such strips, and when these fiber strips have been taken off, the remaining fleshy material is removed and each consecutive sheath is thus worked down to the central core. These strips or ribbons are then given grading as to color which saves considerable time later on. It will be found that six and

sometimes eight grades of strips can be made, ranging in color from a dark red to pure white. But two general grades are, however, ordinarily made from these strips, the fiber of which is separately stripped, cleaned, and handled. The fiber is now ready for the stripping apparatus known as a "panjuijan" which consists of a log set in horizontal position just clear of the ground, and on the top of which is fastened a block of smooth hard wood. Over this block is placed a "bolo" or knife having a blade from thirty to thirty-five centimeters long and a handle of about the same length, to which is attached a strip of rattan connecting with a bamboo spring above. Another rattan passes from the handle to a foot treadle. The bamboo spring holds the knife to the block, its pressure being easily regulated by lengthening or shortening the rattan, and by means of the foot treadle the operator raises the knife as he wishes to insert or remove a ribbon of fiber.

In stripping the operator holds in one hand one of the fiber ribbons and also a short round piece of wood. The strip is inserted under the knife blade and drawn through with a quick steady pull. The ribbon is then removed and reversed, the clean end being wound three or four times around the stock and the process repeated. The knife blade removes all of the pulp or fleshy material, leaving in the hands of the operator a small bunch of clean, wet, individual fibers.

The strength and color of the fiber, two of the most important qualities, are determined largely by the care taken in this cleaning. The work of the fiber stripper is exhaustive, and to strip eight or nine kilos is a good day's work. A stalk of abaca weighing from 100 to 115 kilos will strip but two to two and one-half kilos of fiber. After stripping comes the drying, sorting, official grading by representatives of the fiber division, baling, marketing, and distributing to the four corners of the earth to be converted mostly into cordage.

Of course some other fibers are used to some extent in the manufacture of certain ropes, such as flax, in signal halyard stuff, sisal, jute, and buri, and some manufacturers mix various cheap fibers with Manila hemp to keep down cost of production, but generally speaking the best Manila rope is made only from one or more of the standard grades of abaca. No substitute is as yet in sight for abaca (Manila hemp) in the manufacture of a good grade of cordage, sisal being the nearest approach, and as yet

after much experimenting in manner and method of planting, cultivation, and cleaning it at best produces a fiber infinitely inferior to abaca.

Considering fiber as a whole there is probably more extensive research work going on at present in this field today than at any time in the history of the industry, due probably to lack of competition in two of the most extensively used fibers, abaca or Manila hemp in the manufacture of cordage, and jute for the manufacture of twine, bagging, burlap, and linoleums. The abaca (Manila hemp) is produced solely in the Philippines and the jute in India. This absence of competition tends to cause satisfaction with already existing methods of production, no matter how crude and wasteful, a steady increase in price and lessened production of the higher grades. To offset this, private industry has awakened to the necessity of finding a substitute to broaden the field of competition.

NOTE: 1 inch = 2.54 cm. 1 Kilo = 2,2046 lbs. 1 Bale of hemp = 2 piculs of 139.43995 lbs. each.

AN ADVENTURE IN DIPLOMACY

By Captain Dudley W. Knox, U. S. Navy, Retired

SOON after daylight on the morning of February 14, 1917, the tropic peace of the United States Naval Station, Guantanamo Bay, was broken by the unexpected appearance of three Cuban gunboats at the harbor entrance. After a slight delay incident to the formalities of being spoken and passed by the boat patrol the visitors steamed through the "gate" in the newly laid anti-submarine net, past the United States reservation in the lower harbor, and on to an anchorage in Cuban waters off Caimanera. Not being certain that the inexperienced patrol boats had acted with the punctilious conventions required in dealing with foreign men-of-war, and in any event wishing to allay any possible resentment which the Cuban officers might feel from the peculiar circumstances of having been delayed in entering their own port, the senior officer present, Captain Chester Wells, commanding the U. S. S. *Montana,* together with the writer, then commandant of the Guantanamo Naval Station, waived considerations of rank and made the first call on the Cubans at 10:30 that morning.

It was learned that on the previous day revolutionists had suddenly seized the city of Santiago, where the gunboats had been stationed. Fearing the capture of his vessels the senior officer of the gunboats had hastily sailed for Caimanera, where telegraphic report and request for orders had been made to the authorities at Havana. Whether correctly or not, the writer gained the firm impression during his call that the Cuban naval officers believed themselves lucky to have escaped so successfully from the menace of shore artillery about Santiago; the revolutionists being composed principially of well-equipped and trained regular troops. As the sequel will disclose this apparently certain assumption was responsible for some strange difficulties.

Thus was introduced a four-day period of hard work, sleepless nights, and rapidly changing situations requiring quick de-

cisions. It was one of those numerous diplomatic cases that officers of our Navy have had to handle, in which the situation developed faster than it could be well understood by higher authorities at a distance. The officer on the spot was thus compelled to be nearly always anticipating, and sometimes actually violating instructions, if the apparent necessities of the moment were to be adequately met. Fortunate is he who can divine beforehand the attitude of the State Department after it is in possession of the facts.

Soon after returning from the call upon the Cuban gunboats two radiograms were received. One was from the American consul at Santiago advising that conditions were rapidly growing worse and that the rebels had seized telegraph, telephone, cable, and radio stations. He requested the presence of a man-of-war to maintain radio communication and to allay excitement of the populace. The second message was from the revolutionary commander at Santiago and read "My military orders oblige me to mine the mouth of the bay. This for your information." Evidently prompt action was necessary if the consul's request was to be complied with.

The fleet was then in Guacanayabo Bay. The tug *Potomac* was due in Santiago in a few hours but her radio set was poor. The *Montana* and the *Petrel,* both at Guantanamo, were the only other ships near enough to reach Santiago quickly. The *Montana* was too big to enter Santiago conveniently, and too valuable to risk if rebel mines had already been laid. The writer therefore volunteered the services of the *Petrel,* then acting as station ship at Guantanamo.

It may not be out of place to state that the *Petrel* had been condemned several years before and sent to Guantanamo presumably to end her venerable days there. Her bottom was badly pitted and supposed to be in danger of collapsing, in consequence of which departmental orders forbade taking her into deep water. Her general condition in all departments had approached that of her bottom and in the normal course of events she seemed destined to rust apart beside Guantanamo's pier. But several months previous to the principal events of this narrative, the old ship had been rejuvenated, principally through the untiring energy and devotion to duty of Lieutenant W. D. Lamont, the only other officer attached to her. The machinery was painstakingly overhauled

and a trial trip made inside the Bay, on which within a small fraction of a knot of her best speed was maintained. The ship was correspondingly well overhauled in other departments.

To revert to our narrative, when the order was received to proceed to Santiago, all the *Petrel's* boats and a large part of her crew were on anti-submarine patrol at the harbor entrance several miles away. No fires had been under the boilers for several weeks, yet within three hours she was underway for the haven of trouble, forty miles distant. At the last moment a third officer, Lieutenant W. A. Edwards, had been virtually kidnapped as he stood, from a destroyer lying alongside the station wharf. His resourcefulness, energy, and cheerfulness proved valuable assets to the expedition.

After we passed through the anti-submarine net towards dusk, the principal problem became that of steering close enough to the bold shore to be able to beach the ship if the bottom fell off, yet far enough away to avoid knocking it off by grounding! At 10:00 P.M. the commander-in-chief of the fleet at Guacanayabo sent a radiogram quoting a message from the Navy Department "Send protection only upon order from Washington except to relieve immediate and absolute necessity." In view of these instructions and the possibility that the *Petrel* might be mistaken for a Cuban gunboat during darkness and fired upon from Morro Castle it was decided not to enter Santiago harbor until daylight.

The possibility of some untoward incident as we steamed through the narrows in the morning, lent interest to the occasion. We had taken the precautions of waiting for broad daylight, displaying a large ensign, closing water-tight doors, going to general quarters, and of placing drill guns as dummies in the sponsons left vacant by the landing of half the main battery as a part of the defenses of Guantanamo. But our entrance proved disappointingly featureless, and we were soon at anchor in the upper harbor close to the custom house dock.

Ashore there were few evidences of a revolution except for an unusual number of soldiers about the streets, and on guard at bank doors. It was reported that the rebels had seized about $1,000,000 with which to finance their campaign. Our consul believed the general situation to be serious. The uprising had resulted from the reported refusal of President Menocal to abide by the decision of the supreme court awarding the recent national

election to his political opponent, and had already extended to the three provinces of Santiago, Camaquez, and Oriente. Special concern was felt over the possibility of the revolution taking on the character of a race war, as had been the case in the last revolution. A large proportion of blacks were being recruited and it was feared that this would result in grave disorder in the city in the probable contingency of the regular forces having to take the field. Goods to the value of several million dollars, including thousands of cases of gasoline, were stored about the city docks and large quantities of dynamite, arms, and ammunition were known to be on hand.

Altogether the situation undoubtedly held disturbing probabilities and might demand vigorous action on our part at any time. Correct decisions would depend upon a due consideration of American interests, yet also upon proper respect for Cuban sensibilities and international rights as a sovereign state. Moreover, the general attitude and wishes of our government, as expressed in the instructions received, should be an important factor. At 10:30 P.M. the following message reiterating previous orders was received from the commander-in-chief: "Following from Department quote State Department informed condition in Cuba and hopes existing government will be able to control situation. Send protection only upon order from Washington except to relieve immediate and absolute necessity unquote. Keep C-in-C fully informed."

The peaceful sleep of watchful waiting was broken on board the *Petrel* at 3:00 A.M. when the collector of customs together with an aide of the revolutionary leader called upon the writer. On account of information received by cable from New York they feared that Cuban gunboats would enter the harbor and land federal troops at the city under cover of a bombardment. Their request that the *Petrel* prevent the gunboats from entering had to be declined on the general ground of unwarranted interference with the sovereignty of Cuba, whereupon it was represented that unless I could guarantee the city against bombardment it would be necessary for them to plant mines and sink blocking ships in the narrows to keep the gunboats out. They were assured of my best endeavors to prevent inhumane shelling of the city, and that mining or blocking the entrance channel therefore seemed unnecessary, and would, moreover, constitute an unwarranted in-

fringement of neutral interests. A number of large American and other foreign ships were in port scheduled for an early sailing; others were due to arrive soon.

Shortly after these gentlemen departed the Cuban merchant steamer *Julia,* lying at the wharf close to our anchorage, was undocked by a tug and towed toward the entrance. No lights were exhibited by these vessels, and the time and other circumstances led to the suspicion that the *Julia* was to be sunk in the narrows. Hastily getting up steam the *Petrel* gave chase and overhauled the tow several miles down the bay. The scene when we ranged abreast the Cubans would have done credit to a movie. Our searchlight disclosed soldiers' uniforms moving excitedly about the *Julia's* decks, and at the same time illuminated a near melodrama on board the *Petrel.* We had gone to general quarters, the dummy guns being manned with the rest. The hammock nettings were lined with riflemen. The haste of getting underway had brought the crew from their hammocks in all stages of undress, which there had been no subsequent opportunity to change. The natural excitement of our men over the strange proceedings, together with their distorted facial expression, from the sudden glare of the searchlight, completed a picture strongly suggestive of old-time pirate days.

On hailing the *Julia* it was learned that she was carrying revolutionary forces. Their commander was requested to stop his ship and to call on board the *Petrel* for a conference, where his intention of placing the *Julia* in the narrows preparatory to sinking was soon established. But our gratification at having interfered in time was quickly dispelled by the information that two other block ships were already in place with explosives on board. It was manifestly out of our power to prevent their being sunk whenever the Cubans so chose, in fact even an attempt at prevention might well precipitate its being done by merely firing a fuse. Our interference had come too late to be certainly effective. Moreover, the future action that we might take was restricted by the Department's instructions: "Send protection only upon orders from Washington except to relieve immediate and absolute necessity" might not be construed as warranting the use of force to prevent blocking the channel. A show of force seemed sufficient to stop the *Julia* from proceeding farther but the removal of the vessels already in place was likely to require direct action

on our part, even if the revolutionists showed only passive resistance. The least that the situation required was to keep whatever advantage had been gained, and after stating my objection to having any vessels sunk in the channel I declined to permit the *Julia* to proceed farther. The Cuban officer agreed to anchor his ship at once and to refer the matter to higher authority.

Soon after morning "colors" Colonel Loret de Mola, the military head of the revolution, came on board. He had an engaging as well as forceful personality. Clean-cut, alert, well bred, perfectly poised, and very intelligent, he appeared to be a most capable leader. He emphasized the military necessity of denying federal gunboats access to the harbor, not only to prevent a landing and the capture of his base of operations, but also to avoid the detrimental moral effect upon the populace of such a landing or of bombardment of the city. He was strongly desirous of completing his plan for keeping the gunboats out by blocking the channel with hulks and mines, and declared that if prevented from so doing he was prepared with gasoline and dynamite to fire the city and blow up its principal buildings, in the event of being forced to evacuate it by an attack from the harbor.

In reply my attitude was a reluctance to appear to take sides in the revolution by embarrassing the military operations of himself or his opponents; a proper respect for Cuba's sovereignty; and due regard for the interests afloat and ashore of the United States and other neutrals. The point was made that keeping the harbor accessible to shipping not only accorded with foreign interests, but with his own advantage as well, since it left him the opportunity of getting in supplies by sea. I protested strongly against blocking the channel and the use of contact mines, but indicated that no reasonable objection could be raised to observation mines being laid.

This was met with a cheerful offer to completely comply with my desires in regard to the channel, and further to guarantee a proper safeguard of the city and all foreign property there, if I would agree to keep Cuban government ships from entering the harbor. Association of ideas unconsciously carried my thoughts back to the three gunboats off Caimanera. The contrast between the colonel's fear of them and their apparent fear of his land guns was indeed striking. The possibility of their attempting to enter the harbor seemed too remote to be seriously considered. A

guarantee against such an extremely unlikely possibility seemed to be a very small price to pay for safeguarding the valuable American, Cuban, and foreign property in Santiago, as well as insuring that the channel be kept open to commerce. I decided to take the risk of exceeding my instructions.

Notwithstanding the virtual certainty that federal gunboats would not attempt to enter the harbor, the generally excitable temperament of the Cubans and the nervousness of their leaders over the possibility of such contingency, made it almost sure that the block ships already anchored in the channel would be hastily sunk, even on a false alarm. My first stipulation was that they should be immediately removed to the upper harbor, together with the intercepted block steamer *Julia,* our late companion in melodrama. This, with the other indicated restrictions respecting the security of shore property, the laying of contact mines, and further efforts towards blocking the channel were readily accepted by Colonel de Mola in the agreement then negotiated.

On my part it was guaranteed that federal gunboats should be forbidden entrance, pending reference by radio of the whole matter to the Commander-in-Chief of the United States Fleet, and for a period of twenty-four hours after the receipt of his reply. The latter clause had the object of permitting the revolutionists sufficient time to place the entrance in a proper state of defense, which the agreement prevented while it was in effect. From our anchorage in the lower harbor neither the entrance channel nor its approaches could be well observed, and consequently the colonel undertook to notify us by special signal from Morro Castle of the approach of any federal gunboats. The agreement was concluded at about 10:00 A.M. of February 16 and all block ships were clear of the channel soon after.

My radio notification to the commander-in-chief in regard to the agreement must have crossed a message from him received at about noon, reading as follows: "Regarding Cuban situation Navy Department orders quote send protection only upon orders from Washington, D. C., except to relieve immediate and absolute necessity unquote In carrying out foregoing instructions no action shall be taken unless the necessity is manifestly immediate and in close vicinity period Any action taken shall be reported immediately 09016" The general tone of this did not seem encouraging and I began to have misgivings as to how my decisions

would be viewed up the steps of higher command. I had deliberately committed myself to offend the dignity and sovereignty of Cuba should a ship of her navy desire to enter one of her own ports. A rebel leader had been promised the protection of the United States, against efforts on the part of the regularly constituted and recognized government of Cuba to put down insurrection and preserve law and order. I began to hope that the State Department would have the good sense not to mention the matter to the Cuban minister and then the whole affair would probably blow over and be forgotten by the time the next Selection Board met. Undoubtedly I had exceeded, if not indeed violated, my instructions. But small incidents have a way of being submerged with the large events which come with time, and this affair could only rise to any importance in the practically impossible contingency of a federal gunboat trying to enter the port.

Ten minutes of such reflections were interrupted by the report "Signal flying from Morro Castle, sir." At the first glance through the spyglass it appeared to be the agreed upon warning of the approach of a gunboat. But careful—(very careful)—examination led to the belief, subsequently confirmed, that it was not the signal warning arranged, because the second flag was black instead of being blue. Nevertheless, since this difference might be the result of an error of the signalmen, it seemed worth while to get underway and make certain, however small the possibility of the signal being meant for us. On clearing the narrows twenty minutes later all doubts were removed by clearly distinguishing a small gunboat flying the Cuban flag.

It was a most uncomfortable quarter of an hour while we spoke the gunboat *E. Villuendas,* arranged for the *Petrel* to send a boat for the Cuban captain, and ushered him into my cabin. I started in to make a clean breast of it. There was nothing else to do as I felt in honor bound to keep my promise to de Mola. The gunboat captain seemed a decent sort, and perhaps after all Cuban pride might not prove so irreconcilable as reputed. But, of course, he would have to consider not only his own feelings but the viewpoint of his government as well, and a disagreeable international incident seemed inevitable. He spoke no English and poor Spanish forbade my first statement of the case from being understood, except the references to a revolution. These caused him great surprise and evident concern. He had sailed

from western Cuba several days previously, without any news of the uprising, and on approaching Santiago that morning had been greatly puzzled by signals from the Morro that the harbor was mined and the *E. Villuendas* should not enter without instructions. He had sent his executive officer and three seamen to the Morro by boat to make inquiries, and his principal anxiety now was for their safety, since they had evidently been detained.

The drowning man's straw was never more eagerly grasped than this opportunity to be of service to the Cuban captain, and the sincerity of his thanks for my offers of assistance in rescuing the captives was manifest. He had barely sufficient coal and water left on board to reach Guantanamo, where I assured him emphatically in carefully chosen Spanish that we would be greatly delighted to replenish his bunkers and tanks.

The possibility of going into Santiago never appeared to be a part of his calculations after being informed of the revolt. His hurry to sail for Guantanamo before the *Villuendas'* coal should be exhausted, made it difficult for me to detain him long enough to square my conscience by laying bare the full terms of my agreement with de Mola. He seemed perfectly frank in declaring such action as fully justified by the circumstances, assured me that he had no desire to violate it, and, moreover, volunteered to notify any other gunboats he might fall in with of the advisability of their keeping out of Santiago. If there was any want of cordiality on my part upon his arrival, there was unquestionably no lack of it at his departure.

The attitude of the Cuban naval officer was a great relief; but a naval officer was more likely to understand than statesmen, either in Havana or Washington. The furnishing of coal and water to the gunboat from Guantanamo might have some slight influence towards smoothing matters in diplomatic circles; the rescue of four captives would certainly have much more. As we passed the Morro on the way in Lieutenant Edwards was landed to request that the prisoners be given up. This was refused in positive terms and what was more alarming, the impression was gained that their lives were in danger. Prompt and effective action seemed necessary.

At the conference with Colonel de Mola that morning I had been struck by his seemingly high sense of honor which would have done credit to a Castilian noble. The note of appeal imme-

diately dispatched to him therefore laid great stress upon the points of honor involved in the situation of the prisoners. But for the wrong signal having been made from Morro Castle, the responsibility for which was manifestly his, the *Petrel* would have gotten underway more promptly, and probably have arrived at the entrance in sufficient time to warn off the landing party. It was a question of honor with me to keep out the federal naval forces. The gunboat had been kept from entering but I had been prevented from fully keeping my agreement by the erroneous signal from his station. I felt sure that he also would therefore consider it a point of honor to deliver the prisoners to me. He did so without delay.

At 10:00 P.M. that night (February 16), the expected reply regarding the guarantees was received from the Commander-in-Chief. "Not authorized give such guarantees. Use every measure short of actual force prevent blocking channel. Invite attention serious character such action by unrecognized forces. U. S. S. *San Francisco* arrives morning February 18, 18316." This was reassuring except that it seemed to imply disapproval of the infringement of Cuban sovereignty involved in denying federal gunboats entrance to Santiago. Probably not until after sending the above message had the Commander-in-Chief received my report of the *Villuendas* affair. It was not likely that it would please him. Moreover, he had not referred to the "painful interregnum" of twenty-four hours after the receipt of his reply, during which under the terms of the original agreement, the guarantees were to continue. The appearance of another gunboat would present the dilemma of having either to disobey orders or to break faith.

At 11:20 P.M. Colonel de Mola was informed of the negative decision of the Commander-in-Chief and also that my guarantee would expire at midnight of the succeeding day. He was further notified of my intention to prevent ships from being sunk in the channel, either before or after that time, and that ships attempting such a measure would do so at their own risk. But the chief concern of the anxious hours which followed was over the possibility of the appearance of federal sea forces.

During the next afternoon (February 17) de Mola arrived on the *Petrel* in company with the American consul, Mr. Griffith. They were frankly alarmed over apparently reliable reports of the sailing of gunboats and troopships from Havana, which had

caused great uneasiness among the populace of Santiago. The consul considered the situation critical, fearing that even a false alarm might precipitate disorder which would place lives and valuable property in serious jeopardy. The colonel stressed the very difficult military position in which he was placed by the ban upon his best means of securing the city against an overseas expedition—blocking the channel with sunken ships. He considered as less effective the alternative of using submarine mines protected by rifle and machine-gun fire, and bombs thrown from the cliffs, and dwelt upon the danger to innocent merchant shipping inherent in this kind of defense. Disclaiming any desire to interfere with military operations, but reiterating the importance of protecting American and other neutral interests, I would make no concession as to block ships and protested against the use of contact mines.

It was finally agreed that, pending the arrival of the U. S. S. *San Francisco* due the next morning, no mines except those of the "observation" type would be laid; that special precautions would be taken against injuring innocent vessels; that I would be notified in advance of the placing of any mines; and that final decision in the whole matter would be subject to agreement between de Mola and the commanding officer of the *San Francisco*. The American consul concurred in these arrangements, which served to allay some of the tenseness of the situation.

But my principal concern was not dispelled until 9:40 P.M., scarcely two hours before the time limit for ending my long uncomfortable dilemma, when the below radiogram was received from the flagship: "Comply with following quote Direct senior officer present not permit sinking of ships in channel period Should federal ships attempt to enter warn them of conditions; state that channel will be kept clear and under present conditions federal ships *must not* attempt to enter period Direct senior officer present to make these conditions quite clear to the commander of the revolutionists and commanders of any federal ships that may appear at entrance to harbor 13017 Secretary of The Navy unquote Report if any additional vessels are needed period U.S.S. *Machias* should arrive February 20 Acknowledge 19017." Washington had caught up with the situation, just as the situation had ended.

But the relief of having been finally and fully sustained in the disagreeable necessity of exceeding and violating instructions, which seemed to be pursuing me, left no room for fault finding with any one. Except when the personal characteristics of the man on the spot are well known, and have been proven under responsibility, higher officials of necessity must be cautious and restrictive in their instructions covering delicate situations. When events move faster than they can be cared for at headquarters even with modern communications, as they must often do, there is no way to ensure their being adequately met, except by the initiative, the good judgment, and the readiness to take responsibility of the officer at the scene of action. Fortunate is he who estimates the situation as it will be viewed in higher quarters, where the personal equation also is necessarily variable.

The greater perplexities at Santiago were removed by the despatch from Washington, and even the lesser ones also disappeared an hour later when the rebel engineer came on board with a message from the colonel that no mines of any kind would be placed in the channel until after the arrival of the *San Francisco*. The reason given was a wish to avoid the possibility of accidental damage to that ship, but the disordered clothing, grimy hands, and haggard look of the engineer told a tale of hard and trying work and led to the suspicion that physical difficulties may have had something to do with abandoning the mining project. The arrival of the *San Francisco* next morning completed my relief from embarrassment, and the *Petrel* returned to Guantanamo.

This yarn would not be complete without a sketch of the ultimate outcome of the revolution. The reported federal troopships from Havana were not a myth but landed forces on the flanks and in rear of revolutionary detachments about Camaguey. After several weeks of campaigning the rebels were forced to evacuate Santiago and to retreat up the valley extending towards Guantanamo City. American marines from the naval station were sent to that vicinity and had little difficulty in protecting the numerous sugar mills and plantations against depredations. The strong position taken up by the revolutionists in the valley persuaded the Federals again to utilize their sea power by landing a force near Caimanera in the rebel rear.

In this situation neither side cared to force matters by military operations and there followed several weeks of negotiations and parleys, during which the rebels had difficulty in feeding their army and consequently in holding it together. The writer was present with Captain Wells at a conference at the plantation of Mr. Randolph, in the valley of Ermita, and also at a later meeting on board the *Montana* in Guantanamo Bay. The constant effort of Captain Wells was to bring about a peaceful ending to the uprising. He received able support from the civilians in the valley, led by Mr. Randolph, and his position was greatly strengthened by the presence ashore of the station guard of marines under Captain McDougal.

The passage of time aided the parleys in creating more amicable relations between the two factions. The American civilians acting independently finally brought them to terms along the following lines. The revolution was to be abandoned, the rebel army was to be allowed to disperse, and four of its leaders were to be permitted to leave Cuba secretly and unmolested. An American superintendent of a local railroad informed me confidentially of these terms and asked me to facilitate the secret exit of the leaders, representing the importance of doing so in the general interest of an early return to normalcy. Though assured of the consent of the Cuban government's representatives to this course I doubted the propriety of taking action officially but consented to granting passage to Haiti for four Cuban civilians by the United States naval tug scheduled to sail in a few days. It should be explained that the shipping shortage incident to the World War had so disrupted steamship service to eastern Cuba that any other arrangement for ridding the country of the rebel leaders would have involved an undesirably long delay.

The custom of Cuban civilians frequently visiting the station surgeon for treatment, offered an unostentatious way of smuggling the four refugees to the naval station the day before the sailing of the tug, which was done. The surgeon kindly took them in charge with instructions that I was not to see them personally. On the eve of sailing Mr. Randolph sought me with a request from them that some way be found to place in bank to their credit a check for $4,000 which they still had in their possession. This was stated to be their only remaining money asset and the almost certain difficulty they would have in cashing it would entail much

hardship, and probably prevent them from reaching their ultimate destination of New York.

It so happed that Mr. John B. Henderson, the son of the late United States Senator and a man of great wealth, was awaiting passage in the same tug to Haiti, where he was to make scientific explorations in company with Dr. Bartsch of the National Museum at Washington. The presence of Mr. Henderson seemed to offer a happy solution to the difficulty over the check. He was accordingly let into the secret as to the identity of his fellow passengers, and very kindly consented to arrange their financial difficulty. He also relieved me from a further embarrassment by agreeing to explain the whole affair confidentially to the military governor of Haiti who had not yet been informed of the coming of the refugees.

Doubtless, all would have gone well with the ex-revolutionists in the wind-up of their little fracas but for the great upheaval in the world at large. It was a time when anything German was suspicious and there was some concern over the possibility of Germans starting a revolution in Haiti before the recent American occupation could become stabilized. The German name and appearance of Dr. Bartsch, the scientist companion of Mr. Henderson, was enough to start some quiet investigations during the passage to Port au Prince by an officer passenger returning from leave. The discovery that four Cuban revolutionists had some ramified connection with Dr. Bartsch was sufficient to cause the officer upon arrival to hastily report the circumstances as very suspicious to the military governor.

Henderson and Bartsch were suddenly arrested within a few minutes after reaching their rooms at the hotel, and immediately summoned to a hearing before the governor. Henderson had considerable difficulty in establishing his innocence and the accuracy of his alleged message from the commandant at Guantanamo until he remembered a letter of introduction to the governor which he had taken pains to obtain from the Assistant Secretary of the Navy before leaving Washington.

But this came too late to save the four Cubans in their principal endeavor. The luck was still running against them. Of course they had been arrested also and at once taken to jail and searched. Damaging papers were found on them, all bearing the certification of the Cuban treasury, and all of high denomination. Paper

bills were secreted in their baggage, in their shoes, and sewed in almost every article of clothing. So much money was found on the first search that several others were instituted, each bringing to light more treasure than the one before. An eye-witness stated that the fits of sneezing induced by the removal of their clothing brought new showers of bills from unsuspected places. A total of about $210,000 was recovered from them and returned to the Cuban government. Thus was written the final chapter in my adventure in diplomacy.

BURRAGE TIME BOARD

By Rear Admiral G. H. Burrage, U. S. Navy

THE Burrage Time Board is designed to assist the officers when maneuvering their ships to determine the time to go from one position to another.

The following explanation of its construction is given to facilitate the understanding of how to use it.

As a ship will steam in three minutes 100 yards at one knot, 200 yards at two knots, 1,200 yards at twelve knots, and so forth, the three-minute line is plotted with these coordinates. See Fig. 1. The scale at the top is hundreds of yards, the scale at the right is in knots.

The distance 1,800 yards steamed in three minutes at eighteen knots is divided at the bottom of the board into minutes and seconds of time, so that the time to steam any distance at eighteen knots up to 1,800 yards is found at the bottom on the scale of time.

By connecting the *o* by diagonal lines with the time scale at the bottom, the distances steamed in three minutes at the various speeds are divided into the same proportional parts of minutes and seconds; thus, at eight knots, the 800 yards, *A-B*, steamed in three minutes is divided into minutes and seconds.

If the required distance is 4,000 yards, the time required at eight knots is found by taking one-tenth of 4,000, or 400, which is within the limit of the scale of the board.

Four-hundred-yard vertical line crosses the eight-knot *A-B* line at *C*, on the one-minute thirty-seconds diagonal line. Multiplying by ten for 4,000 yards, gives ten minutes 300 seconds, or fifteen minutes, the time to steam 4,000 yards at eight knots.

The problem of going from *A* to *B*, Fig. 2, C-L being the course of the guide, requires obliquing at the course and speed of *C-D*, drawn to scale; then *C-G* is the horizontal speed made while obliquing on the course and speed *C-D*.

Having plotted *A-B* on the maneuvering board, the horizontal distance *A-F* is determined. Knowing the horizontal distance

A-F in yards or miles and with the horizontal speed *C-G*, the time to go from *A* to *B* is found.

Combining Fig. 1 with a quadrant of the maneuvering board gives Fig. 3 on the Time Board.

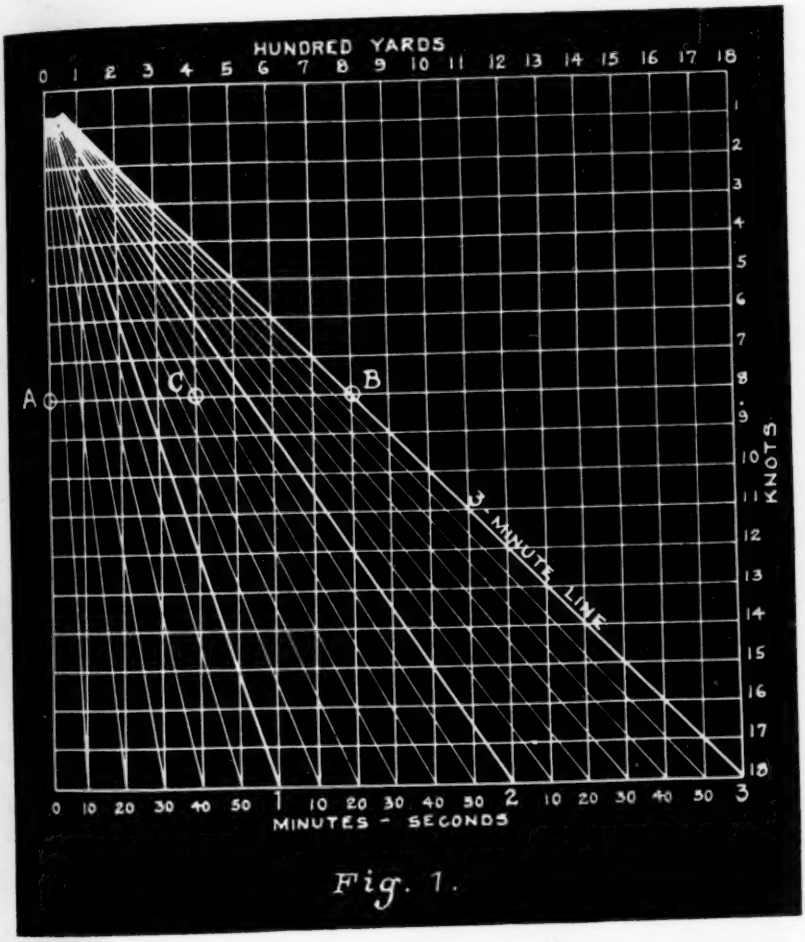


Fig. 1.

In any problem of going from one position *A*, Fig. 2, to another, *B*, both positions are plotted on the maneuvering board, the change of course or oblique for the maneuver determined and the horizontal distance *A-F* found as shown in Fig. 2. Then the time board solves the problem of the time to go from *A* to *B*.

How long will it take to go from *A* to *B* in a problem requiring an oblique of 30° at sixteen knots, when the horizontal distance to be gained is 1,200 yards? The solution is in heavy lines, Fig. 3.

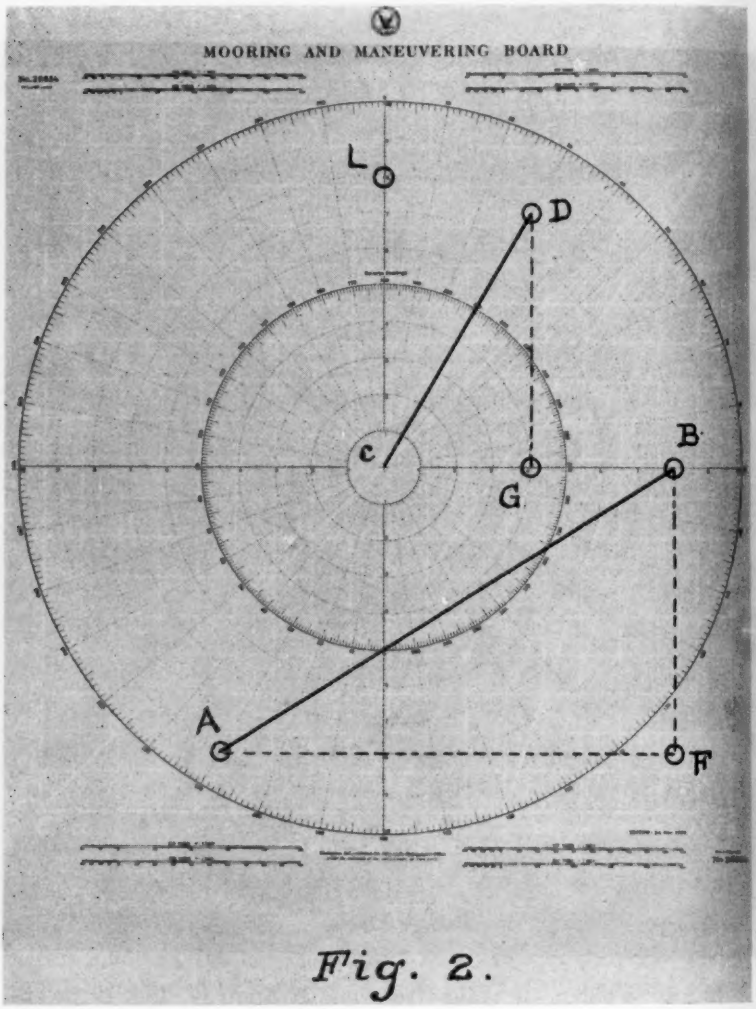


Fig. 2.

Follow the sixteen-knot circle to 30° at *E*: *E-K* is the horizontal distance made good in three minutes, or 800 yards by the scale at the top. Follow the vertical line through *E* to the three-minute

diagonal line at *F: F-G* is the same as *E-K*, or 800 yards, but *F-G* is divided into minutes and seconds of time by the diagonal lines.

As the distance *E-K* steamed in three minutes is 800 yards, or less than the 1,200 yards required, take one third of 1,200, or 400

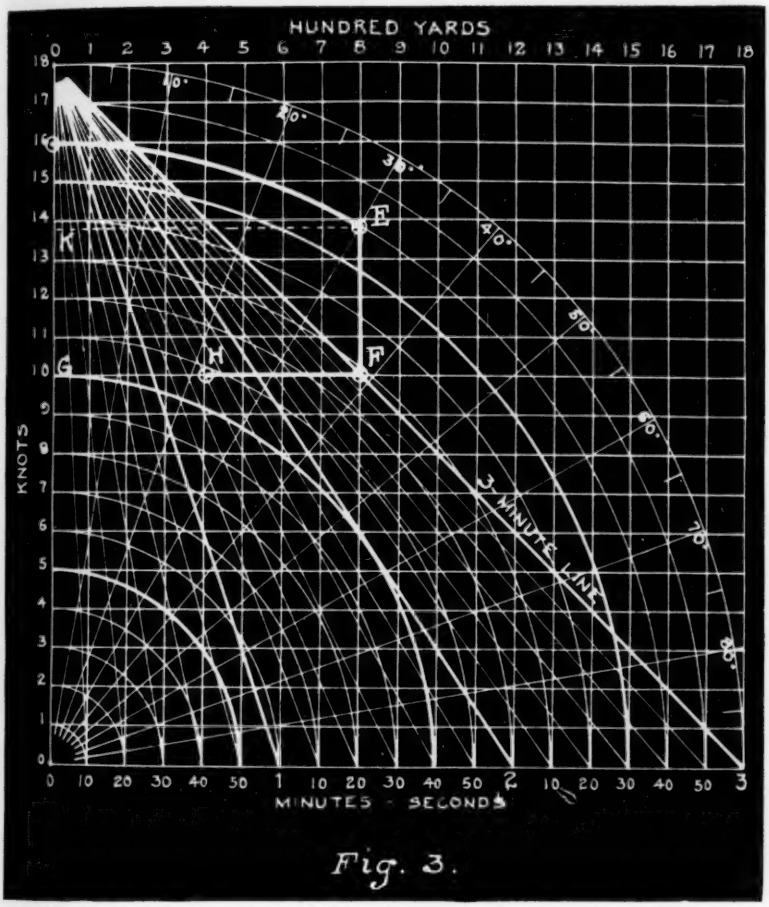


Fig. 3.

yards; find the time to go that distance and multiply by three for the 1,200 yards.

The 400-yard vertical line crosses *F-G* at *H*, which is on the one-minute-thirty-seconds diagonal line, and is the time to gain 400 yards horizontally. The horizontal distance of 1,200 yards will

take three times one minute and thirty seconds, or 4 minutes thirty seconds, which gives the time to gain 1,200 yards horizontally, or the time to go from *A* to *B*, as plotted on the maneuvering board.

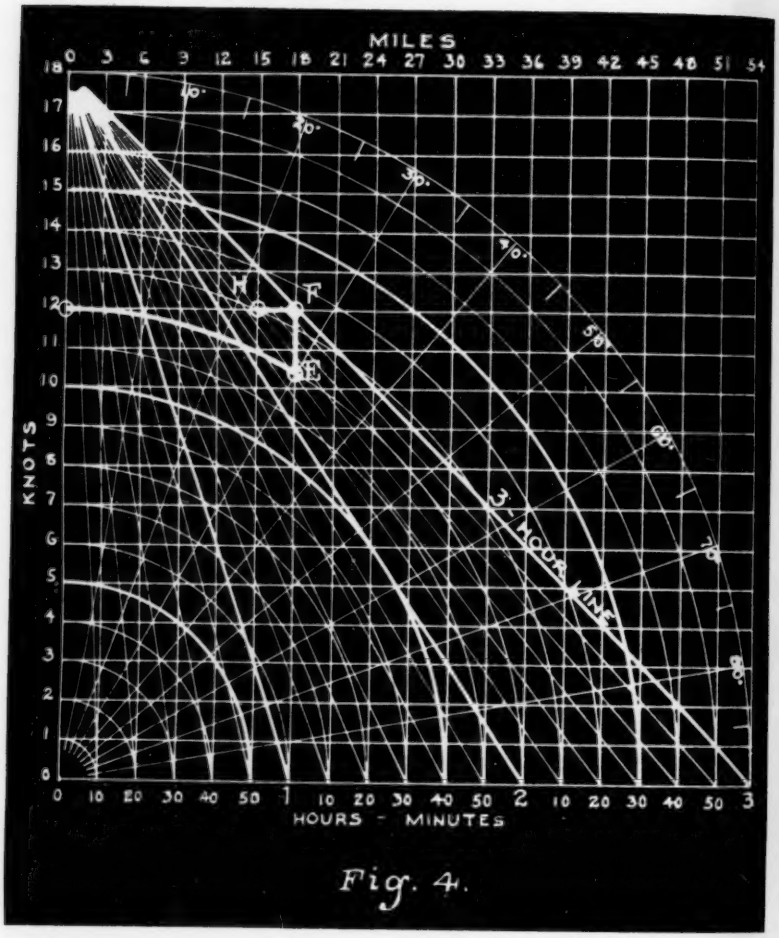


Fig. 4.

For long distances, the time scale at the bottom becomes hours and minutes, and the corresponding distances on the scale at the top become miles.

The operation for solving the problem is the same. Example: To reach the new position *B* with a speed of twenty-four knots and an oblique of 30° requires gaining the horizontal dis-

tance of fifteen miles; use half the speed, or twelve knots, to be within the scale of the diagram, and take half the time for the twenty-four knots. Operation is as follows—See Fig. 4. Follow the twelve-knot circle to a 30° oblique at *E*. Follow the vertical line through *E* to the three-hour line at *F*. Follow horizontal line to fifteen-mile vertical line at *H*. *H* is on the two-hour-thirty-minute diagonal line, which is the required time for twelve knots; for twenty-four knots take half the time, or one hour fifteen minutes.

Example: The next astern of the guide is directed to be 20,000 yards abeam of the guide at 9:00 A.M., steaming at fourteen knots, standard speed being twelve knots, What is the time to start?

The time board shows that at fourteen knots it requires an oblique of 30° to make twelve knots advance, the same speed as the guide. Follow the fourteen-knot circle to 30° oblique, then down to three-hour line and across to the ten-mile vertical line gives one hour twenty-five minutes on the diagonal line, which is the time to gain the ten miles, and the start should, therefore, be made by 7:30 A.M.

Construct the diagram on 1″ cross-section paper—1″ = 100 yards or 1 knot.

PAPER WORK

By Lieutenant Commander F. E. M. Whiting, U. S. Navy

[Editor's note: Written in January, 1925. See discussion by Rear Admiral W. L. Rodgers on page 316 of this issue.]

A REPORT is a communication which should give information of value to the person receiving it. To be of much value, it must show at the time it reaches the receiver the conditions existing at that time or shortly before. The simplest thing in the world for a staff officer or an office to do is to require a report to be submitted. Each office is apt to believe, in true American fashion, that it is all important and therefore to require a report in the form most convenient to itself. This causes duplication and unnecessary reports.

As the fleet, or that portion of it with which I am familiar, is organized at present there is a fleet commander, a destroyer squadrons commander, a squadron commander, a division commander, and finally the commanding officer who does most of the submitting of reports. The destroyer squadrons commander is new in the field but heretofore his place has been taken by the fleet commander. The commanding officer is the neck of the bottle.

Sometimes these commanders or offices require the same report in a different fashion. The Department or fleet commander may send a letter to all vessels of the fleet requiring a report and the squadron commander, not realizing that each ship has been called upon to answer direct, comes along with a follow up and requires either a copy or the report to be submitted through him. By the time the second letter has reached the commanding officer the reply is apt to have been mailed and sometimes a new copy must be made or a new report submitted.

An example of the worst duplication of reports that I have seen follows:

A ship is to go to a navy yard for repairs and inspection by the Board of Inspection and Survey, about the first of the quarter. There is required: first, all individual requests for repairs or

alterations to the navy yard with reasons therefor; second, a summary of all individual requests to the Chief of Naval Operations in the order of importance; third, a summary of all individual requests to the senior member of the Board of Inspection and Survey; and fourth, a summary of all items to the Commander-in-Chief, United States Fleet, arranged by titles, and so forth, as a quarterly report of material readiness for war. That is a big job for one yeoman when one considers that the last report alone uses some fifty typewritten sheets, many of which, it is true, may have "no remarks" on them.

A navy yard can get along with one copy of a request for work. Upon the arrival of a ship for repairs, an arrival conference is held, certain items are deleted and the status of others is changed. From the information gleaned at the arrival conference, the navy yard issues blue printed copies of job orders, copies of which can be furnished all those desiring them. Would it not be a considerable saving in paper work if the present method of submitting job orders were changed and a copy of the ship's material readiness for war report were forwarded to the navy yard each quarter or just before going to a yard?

I am well aware that years ago requests for repairs were submitted as a whole and that in the past few years the manner of submitting requests has changed so that now each individual request is on a separate sheet. Have we not gone around in a cycle by making several slightly different reports take the place of the old method of submitting requests for repairs—in other words by requiring reports to be submitted in the form most convenient to the office which receives them? This may facilitate matters for the individual office but it adds considerably to the paper work of each commanding officer.

In the same fashion, if, instead of a summary of work required in the order of importance now submitted to Operations, a copy of the material readiness for war report arranged in order of importance and by titles were submitted, Operations would have available all the information it requires. The same report would suffice for the Board of Inspection and Survey, except that it could be marked in ink, in the order of location, thus making one report, that of material readiness for war, take the place of four.

On the face of this there are several objections, first, that the superior in command who acts on requests for work will not have

a proper opportunity to approve or disapprove them as the requests will arrive *en masse* rather than individually. If a proper material inspection is made at admiral's inspection or by the squadron commander and his staff from time to time, unnecessary items should not appear at all.

Again, after the ship arrives at a yard, the yard itself has an opportunity to delete items—this is not good practice but apparently is in vogue at present. After a piece of machinery is broken down at the yard, supplemental work is often found necessary—these can be covered by individual requests. As a rule there are not many. If the report of material readiness for war is of any value, it should be able to take the place of (*a*) individual work requests, (*b*) summary of requests submitted to Operations in order of importance, and (*c*) by marking it legibly, summary of requests submitted to the Board of Inspection and Survey in order of locality. Also, if the yard has at hand a list of the work the ship's force is going to undertake, the yard can see whether the ship intends to do its part or not. This interchange of information cannot help but increase mutual good feeling between the ship and the yard. Can sufficient legible copies be made for the various offices requiring them? If these four reports were combined into one the following copies would be necessary:

1. Operations
2. Commander-in-Chief, U. S. Fleet
3. Fleet commander
4. Squadrons commander
5. Squadron or battleship division commander
6. Navy yard
7. File
8. When necessary, Board of Inspection and Survey

Eight or nine legible copies can be typed at one time if onion skin paper and due care are used.

If the requests for work were submitted in this fashion, all concerned would be properly informed with one copy instead of the various methods used at present. It is true that the necessity for the work being performed would not appear in the material readiness for war reports. In many cases the necessity is obvious. In other cases it can only be surmised on board ship. If a proper inspection has been made by a squadron commander, or division

commander, and his staff, that officer will know the necessity for the item and as he is the immediate superior, any statement he may make on the report must carry great weight with the office giving the final decision. In a certain case the squadron commander had no opportunity to inspect. The Board of Inspection and Survey did inspect and they rejected very few items of the commanding officer's list. The navy yard changed a few, mainly because of lack of funds.

Another example of duplication occurs. The Bureau of Navigation requires monthly reports of officers attached to a ship. This report is submitted to the bureau by three different methods; first, in the log; second, on a form showing battle stations and officers in training; and third, on a special destroyer form. In addition, the same report in a slightly different fashion is required by the commander destroyer squadrons, each month.

So far as a destroyer is concerned all the necessary information can be inserted in the form now in the log by rearranging the columns. If the bureau requires more than one copy why should not an extra copy of the report in the log be submitted? If the information contained in the log is not sufficient for the commander destroyer squadrons, why not make it complete for all hands and submit copies to those requiring it? The only conceivable objection I can see to this is that the log is not on 8 x 10½ paper and therefore the yeoman may raise some objection because it does not fit the files. I do not for a minute intend to be facetious when I make the above statement. A yeoman can bring great weight to bear upon the manner and form in which reports are to be submitted.

The report of officers submitted to the commander destroyer squadrons also is required to be submitted to the patrol officers when liberty ports are visited. For all practical purposes the Navy Directory should suffice for the patrol officer. It is in a more convenient form but, of course, if the Navy Directory is out of date before it is printed (every two months) no reliance can be placed on it. In this connection I know of one officer who was carried on the books in the Navy Directory in a certain command for nine months after he had left it. Officers have often remarked of the same thing to me. But if the Navy Directory is kept up to date, confidence in its correctness will grow in the service and

perhaps the time would come when the only report required would be the copy in the back of the log.

The same is true of the report of vacancies of enlisted men. It is submitted in one form in the back of the log each month and another in the vacancy report. These two reports by reprinting could be made identical and another report eliminated. Certainly the status of enlisted personnel does not change every fifteen days. Once a month should be enough for any administrative head particularly as the ship can typewrite the rates of men to be discharged during the current month on that part of the report which can be set aside for it. However, if it is desired every fifteen days, we could at least make the report of vacancies in the log and that submitted separately at present the same form so that duplication may be eliminated.

Examples similar to the above in one form or another are constantly occurring—they cause the commanding officers a certain amount of unnecessary worry and checking up. Is it worth it? Do we gain in efficiency by making the mail one of the most important items of the day? What a feeling of relief one has when he goes to sea and can only be reached by radio.

Other examples arise of a somewhat different nature. I believe information given in these reports may be misleading and thus worse than none at all. Recently I received a letter from the Commander Train desiring to know among other things the stores necessary for a certain stay away from home waters. After consultation among the heads of departments a list was submitted. I was later informed that the tenders would submit it for destroyers. Why is the letter sent to me then? In the same letter, a report was to be submitted in regard to the fuel to be used during the cruise. How could I do so intelligently when I did not have the operation order for the cruise? The speed at which I was to cruise was not known to me. The information I could give would be the merest guess work and no reliance should be placed upon it—and probably wasn't. But it took the time of the chief engineer who should have been watching the progress of work in his department. Also, this report got under my skin a bit as five years ago there was in the possession of the Train Commander curves issued by the Navy Department showing by actual performance the amount of fuel used by ships of the Navy. With the information on hand in the Train Commander's files there

should have been no necessity for asking the ships. He should be able to tell more accurately than the ships themselves as his records are permanent whereas the personnel of the ships are continually changing. He knows the proper factor of safety to apply and each ship may use a different one.

Again, for example, a letter was received asking whether or not numbers were desired on the stern. The operation or military value of the ship is not affected. They are on now, why change? What difference does it make anyway? If the squadrons commander wants them, let's have them, if not, let's do away with them. What is the difference? Why is a report necessary from nineteen boats? I'll venture to say they were in no way unanimous.

Are all these multitudinous reports read? There is one I feel sure is not. It is a weekly report showing various drills held. After having been aboard for about two months the executive officer showed it to me, saying he had just seen it. I thought, "We have gone two months without any mention being made—I wonder how long we can go." Up to the time I was detached, total time four months, no order directing that it be submitted had been received. And after three and one half months, another ship asked me what I was doing about submitting the report. When I informed him of my procedure he said he thought he would try the same. As this seemed to me to be a fairly important report, I was loath to believe that it was not read. But hence I deduce that others are not.

What is the solution? Afloat, I believe that if the minor staffs are to be as large as they are at present they should be there for tactical and inspection purposes only. The squadrons commander and commander-in-chief should do the administrating.

As an example, the squadron gunnery officer or squadron engineer officer with whom I have been in company for a month each, total time two months, has not visited any other part of the ship than the wardroom and the passage from the gangway to the wardroom ladder. They must rely therefore upon reports for their information. Within certain limits I can tell them as much or as little as I want to in a report and they will not know the difference unless they come aboard and take a look around. True, they may learn something after the reports of gunnery exercises

and enginering performances are submitted but if the ship is satisfactory even that is problematical.

During the last year I sat on two boards of investigation to investigate poor scores in target practice. The practice was held, I think, in August, 1923, the investigation in the latter part of February, 1924, or early in March. The paper work was completed in accordance with the standard practice at the time but I felt that I had wasted the amount of time necessary to conduct the investigation. The commanding officer of one ship had changed, the matter was fresh in no one's mind, others of the personnel had changed. If the board had been held immediately, something might have been learned but the administrative staff failed to take account of the operations of the vessels so that when the board did meet, few facts could be learned.

In both this example and the weekly report of drills there evidently was no check system to follow it up. In the case of the weekly report of drills I should have been brought to with a round turn, in that of the investigation the matter should have been dropped.

Every staff should not be administrative. One administrative staff perforce is enough and if other staffs are inspection and tactical staffs we will undoubtedly lessen the paper work and increase in efficiency. To do one's paper work conscientiously takes too much time and decreases operative efficiency on the part of all hands. This is particularly true of a small ship.

The examples I have quoted are merely used to show what are, in my opinion, cases of needless duplication, "nuisance" reports similar to the so-called "nuisance" taxes, and lack of inspection. They were principally noted in a period of above three months in the latter part of 1924. If we stop to think we can find others of a very similar nature continually occurring.

Undoubtedly, if a real effort were made to slash reports the number could be reduced considerably with the result that many hours could be saved for those responsible for the operation of ships. As it is at present, an officer is apt to let the paper work of the ship slide; he has an alibi for not being on his station.

The Bureau of Engineering helps by sending with the letter requiring a report on small alterations or equipment a form practically completed except for the date. It is a pleasure to see cooperation of this type but in general it does not extend throughout

the service at large. In this connection I have made no mention of gunnery reports as I have not recently fired through a gunnery year. The great majority of officers with whom I have talked simply loathe these reports.

Title *B* Books and Allotments

Under the present system of handling title *B* articles it is possible for a commanding officer or head of department to permit his stock of spares to run down and spend the allotment on cleaning gear and paint. For instance one can survey life jackets, fire hose, and so forth, yet if they are not replaced the money which should be used for replacements can be used for bright work polish, cleaning gear, and paint, and thereby the safety of the ship or personnel may be jeopardized. This would really be "beating the game" and it is assumed that it is not done, but, under the present system afloat, it is possible. However, we must place our trust somewhere so we trust our commanding officers to keep the equipment and spares filled.

Inasmuch as we trust them to do that, why should we not go one step further and remove from the title *B* books all items, with certain exceptions which I will describe in detail in the next paragraph, up to a certain stated value; for example, say $100, and transfer them to title *X*. Personally, in many cases, I should go far higher than $100. Formerly, it cost the ship nothing to replace surveyed articles. Now it comes out of one's quarterly allotment, but if the money is not available or if the ship will get a poor mark at inspection, by not being able to continue her cleaning "ration," it is quite possible not to replace articles which, though little used, may be vital in an emergency.

The items costing less than the above-mentioned sum which I would keep on the title *B* books are those articles having a commercial value which might make it worth a man's while to steal and sell or pawn, such as radio equipment, stop watches, sextants, binoculars, and so forth. We should be held even more strictly responsible for items of this character than we are at present.

If articles having little or no commercial value were wiped off the title *B* books it would mean a considerable saving in paper work as many, many surveys are for small items—five life belts, one lantern, a brass, a tackle, and so forth. They were probably lost in the natural course of events plus a certain amount of care-

lessness, broken or worn out in use. How many times do we survey an anchor buoy or, having surveyed it once, manufacture our own, out of a piece of wood?

If the books were radically changed so that this type of item were placed in title *X*, I believe 75 per cent of the surveys would be eliminated, thus saving a very considerable amount of time for officers and men in the aggregate, with no material loss to the Navy. The supply officer of the ship and I examined the surveys submitted since July 1, 1924, and reached the following conclusion:

Thirty-one surveys for material in the great majority of which no single item is over $100, and not more than one or two items, on large surveys (thirty to sixty odd items), had any commercial value.

Thirteen surveys for material which, if not accounted for, would have commercial value.

Four surveys which really amount to requests for repairs to typewriters, adding machines, and so forth.

Four surveys for material far in excess of $100 as follows:

1. 1 potato peeler
2. 2 gasoline engines
3. 1 steam launch boiler
4. 1 ice machine cooling coil

Therefore, for a total of fifty-two surveys, thirty-one would be omitted, four are really requests for repairs, and seventeen would occur under the new plan. Roughly, over 60 per cent of the paper work would be saved.

At a navy yard there are several officers assigned to survey duty alone. As a commanding officer or a head of department, I consider myself just as well qualified as most of the officers detailed for this duty to determine whether an item needs replacement. Possibly, formerly, it was necessary to have such an officer to prevent ships from surveying material and gear which was still in good condition. Now, that it must be *replaced from the ship's allotment* we are not very keen about surveying material which is still of value. Money is tight. Of course, when it comes to the question of surveying a boat the master boatman would be consulted if necessary, but the Bureau of Construction and Repair has already covered that by ordering it surveyed if its cost of repair is above a certain percentage of its original cost value.

If this material of slight commercial value could be replaced as the commanding officer desired, the necessity of more than one officer as a survey officer at a navy yard would cease and their services could be used in other departments or at sea.

At present it is usual to turn into store surveyed material which may be of use for a short length of time but which the ship would not desire to start on an extended cruise without replacing. If it were possible to retain this on board the life of the new material would be extended.

I mentioned before drawing the line at $100 to shift from title *B* to title *X*. In certain cases I would go over that figure. Awnings certainly do not have to be carried on the title *B* books. Every ship should have a good set and there is little or no danger of anyone stealing them—there are undoubtedly many other items of a similar nature. An objection to the above suggestions may be that without definite responsibility the tendency would be to permit the spares to run down. This can happen just as readily under the present system. All that is necessary is to survey an item and not to replace it, for one cause or another.

If the material bureaus object to so much material being on a ship and not under charge, we can originate a new title which would consist of that material which has little or no selling value as described before, but which may be replaced without survey under title *X* and be charged to the quarterly allotment. Even such a step would be a considerable saving in paper work. But though all the title *B* material on board is on charge and the books are correct there is absolutely no method by which we can be certain that vital material is present. This depends purely on the will of the commanding officer to keep his ship well equipped.

If those having the extra allotment to disburse, object to the fact that ships might request extra allotments for material which still is of value, this could be taken care of by the minor inspection commander requiring the commanding officer to show him a list of material to be renewed for which an extra allotment is to be asked at his inspection.

Summing up, I think the question of paper work is largely a question of personality, inspection, and administration. These are all interlocking. If the characters of the commanding officers and heads of departments are such that they cannot be trusted then many reports are necessary to check up. These at least give the administrative head a certain sense of security the value of which,

however, is doubtful. We trust an officer to command a ship or a head of a department with the responsibility of his department. Yet we will not trust either to judge finally if a piston ring is worn out when the ship is at a navy yard; we require another officer to inspect to see if what the commanding officer or head of department says is so. If it were found that officers asked for material to be surveyed which did not require it and disciplinary action in the form of detachment were taken such practice would cease. Personally, I do not believe that under the present system of allotment such a practice exists.

If inspections are made at frequent intervals—they may be formal or informal—the inspecting officer will soon know more about the condition of any ship than reports can tell him, provided, of course, that he himself can be trusted in turn by his superior to inspect in a proper manner. A command will get more good from the captain and the inspecting officer walking around the ship or inspecting drills at frequent intervals than it will from all the weekly reports in the world—particularly when they are not always read. The inspecting officer will have much more opportunity to see things as they really are if he drops aboard unexpectedly and watches some particular exercise or looks over the ship. No ships looks at all times as she does at admiral's inspection—she is on parade then, which is as it should be. But what does she look like ten days after admiral's inspection—what is the average—how do the men look? After all, if informal inspections are held at odd times, will not the general average improve?

From an administrative point of view we tend to rely too much on reports. We do not use the records at hand to gather available information but take the path of least resistance and require our subordinates to do so. As a result, staffs and offices tend to steep themselves in paper work, so much so that unnecessary reports are required and decisions are not made at the beginning without lost motion creeping in. This is passed on to lower and lower offices until it finally rests with the ship. The result is, as I said before, that the ship's officers spend too much of their time in their rooms or around the wardroom table preparing replies to multitudinous reports.

Staffs and offices must plan, at all times, to reduce paper work which will interfere with the time available for internal work on board ship. The convenience of the ship should be paramount,

it should receive every consideration, for, after all, it is upon the efficiency of the ships that we depend. If a report will increase efficiency every one will gladly assist in its preparation. I realize that many are necessary evils due to some law, or for a matter of record—not data.

However, to solve the matter of paper work, it is necessary for some one with plenty of authority behind him to wield an axe. It cannot be settled in a week. It will be necessary for this person to make those originating reports absolutely justify themselves—every office which requires reports must be put on the defensive, each must show that the information desired can only be obtained by that one report, that it is impossible to combine it with some other, that it cannot be obtained from data already at hand and, above all, that after the report is received some good legitimate use is made of it, and then, after that is accomplished, there should be some almighty power to prevent their creeping back insidiously.

THREE TOASTS

REPORTED BY THE NAVIGATOR

By Commodore E. B. Underwood, U. S. Navy, Retired

MANY years ago (1881-84), I made a cruise in the U.S.S. *Pensacola*. When I joined her, she was our flagship in the Pacific, and bore the flag of the late Rear Admiral George B. Balch.

Peru and Chile were at war, and, for the first two years of the cruise, we were closely confined to the west coast of South America, most of the time being spent at anchor in the harbor of Callao, engaged in the occupation of "watchful waiting"—though that particular expression was then unknown. Both Lima and Callao were held by the Chilean Army of Occupation. All activities on shore were dead, and, indeed, none of our people were allowed out of the ship after sundown. (A little extravaganza called *The Off-shore Gull,* published in the U. S. Naval Institute Proceedings for August, 1923, throws a side light on life in the wardroom at that time.)

At last came a joyous day in July, 1883, when we were relieved as flagship by the *Hartford* and a few days later started on a ten-months' homeward bound cruise around the world, under command of Captain "Bully" Erben, who was by no means the fearsome thing his name would imply. It may interest some of my readers to know that among the members of our crew was "Dave" Ireland, who, a few years later, was to appear as one of the four old salts in the well known, inimitable picture taken by Doctor Whittaker, in the *Mohican*, in 1888, a good sized copy of which now hangs in Recreation Hall, in the midshipmen's quarters at the Naval Academy. (In this picture, Ireland is on the left, seated on a ditty box, arms folded, with his head turned towards his three shipmates—Purdy, Griffiths, and King.)

It is not my purpose to go into many details of this cruise—the best that ever fell to my lot. Suffice it to say that we circumnavigated the globe, mostly under sail, visited Honolulu, three

ports in Japan, Hong Kong, Singapore, and Batavia, two ports in Madagascar, two in South Africa, St. Helena, Barbados, and Bermuda, arrived at Hampton Roads in May, 1884, and went out of commission in Norfolk the next month.

During the entire cruise, we made a good deal of national holidays, the dinner in each case being the principal feature of the day. This was particularly true on the coast of Peru, where there were no attractions extraneous to the ship, and where everybody had to be on board by dinner time. I especially remember two Fourth of July dinners at Callao. Of course, at the present time, these dinners would be thought nothing extraordinary, but we were under certain handicaps. Our dining hour was primitive, we were limited to oil and tallow for illumination, we had no imposing array of silverware, chinaware, glassware, and napery, and we lacked the presence of the other sex to give grace and charm to the occasion.

We had, on the other hand, a good steward, an excellent cook, and a very decent orchestra of stringed instruments. The coming permanently closed season on wine was not then even dimly discernible in the distance, and the caterer of our wine mess—not called "treasurer" then—always kept on hand an adequate supply of good Havana cigars, better and lower priced then, be it said, than in the present degenerate days.

When the dinner hour arrived, all hands dressed in their "glad rags" took their seats at the mess table, each member being ready to do his best for his fellows, in the way of yarn, joke, or toast. The dinner passed off with fun and banter, each member striking his own little note at the opportune time. Our navigator—Lieutenant Franklin Hanford—was always the last to have his "little say." And he always told the same yarn. After its first appearance, he had to. The mess would tolerate no other. And he never told it at any other time. I shall try to give it in his own words, but the result will be no more than an approximation.

"In the summer of 1865, there was an unusual concourse of Americans gathered in Paris, most of them doubtless being brought there by the reaction after four years of the Civil War. The last battle of that memorable conflict had been fought not many weeks before, and most of the men present were fresh from the discipline and privations of army life, and so were out to have a 'good time' in the French capital. One form of their activity

was the prospective celebration of the Fourth of July. A committee was formed and went systematically to work, and succeeded in producing a most satisfactory result. On the anniversary in question, a goodly company assembled at one of the leading restaurants, Voisin's perhaps, where they had their palates tickled by viands prepared by accomplished chefs and washed down by the best of French wines. Gaiety and light-heartedness prevailed throughout the evening. When the post prandial period—no, not 'post brandial'—I say when the post prandial period of the evening arrived, the chairman, rising to his feet and rapping for silence said, 'Gentlemen, I propose that we drink to the good old United States of America, once more bounded on the north by the British possessions, on the south by the Gulf of Mexico, on the east by the Atlantic, and on the west by the Pacific Ocean.' (*Applause.*)

"No sooner had the chairman finished than a more enthusiastic member of the company jumped to his feet, and said, 'Mr. Chairman, I think I have a better toast than yours. I propose that we drink to the good old United States of America, a country, as I see it, bounded on the north by the North Pole, on the south by the South Pole, on the east by the rising, and on the west by the setting, sun.' (*Great Applause.*)

"No sooner had number two taken his seat than a still greater enthusiast sprang to his feet and said, 'Mr. Chairman, I think I have a better toast than either of its predecessors. I propose that we drink to the good old United States of America, a country, as I see it in my vision, bounded on the north by the Aurora Borealis, on the south by the precession of the equinoxes, on the east by primeval chaos, and on the west by the Day of Judgment.' (*Long continued and tumultuous applause.*)

"And now gentlemen," concluded the navigator, "in order to show our entire accord with the spirit of these three toasts, let us each drink a full glass of champagne." (*Prompt compliance.*)

Gone are the "wooden walls," the spars, the sails of our Navy of forty years ago; and gone are nearly all of my fellow members of the *Pensacola's* pleasant wardroom mess at the time of which I write; "they lived their lives, they had their day, and time and tide have swept them away."

And the few survivors that still cumber the earth are in the so-called "senile seventies"; indeed the navigator—now Rear Ad-

miral Hanford—is an octogenarian. Since we have passed the scriptural limit of "three score and ten," the burden of years bears more or less heavily on us. To adopt an expression of one of our number, Rear Admiral Delano, we can't make as many revolutions as we could in the old *Pensacola* days. However, such is life. Have we not been told that man is born to trouble as the sparks fly upward?

Speaking for myself alone, though a few of my service hopes are unfulfilled, a few aspirations ungratified, nevertheless I have fortunately found that the kindly hand of Time alleviates disappointments, calms hurt minds, soothes heart burnings.

(NOTE: Somehow, somewhere, I have gathered the impression that toast number three quoted by the Navigator originated with that well-known humorist the late Artemus Ward, but the impression is elusive and may well be entirely erroneous. If any reader of the foregoing sketch should be able to throw any light upon this point, I hope that he will do so.)

COMPARATIVE NAVAL DATA FOR THE TREATY NAVIES

(Correct as of October 1, 1925)

(Comparison based on ratio of tonnage for capital ships established by Washington Conference Treaties for Limitation of Naval Armament)

TABLE I—PERSONNEL (Unlimited)

POWER	REGULAR ESTABLISHMENT (INCLUDING THOSE OF DOMINIONS) (X)		REGULAR ESTABLISHMENT ON BASIS OF 5-5-3-1.67-1.67 RATIO WITH BRITISH EMPIRE		INCREMENT NECESSARY TO TO ATTAIN THE 5-5-3-1.67-1.67 IN REGULAR ESTABLISHMENT		ACTUAL RESERVE PERSONNEL	
	Officers	Men	Officers	Men	Officers	Men	Officers	Men
UNITED STATES	8,312	81,702	8,846	95,922	534	14,220	5,037(c)	25,030(c)
BRITISH EMPIRE	8,846(a)	95,922(a)	8,846	95,922	None		10,425(d)	64,742(d)
JAPANESE EMPIRE	7,143(b)	65,412	5,307	57,553	None		3,394	38,988
FRANCE	3,493	50,487	2,954	32,037	None		8,945	153,980
ITALY	2,233	40,881	2,954	32,037	721	None	4,731	60,000

a) Includes 357 officers and 2,480 men of Royal Air Force performing naval aviation duties. The Royal Air Force is a separate Department, ranking with the Army and Navy, and has in round numbers (August 31, 1925) 3,448 officers,29,797 airmen, and 8,763 civilians. Since in the United States, Japan, and France, naval aviation personnel forms an integral part of the Navy, it seems only fair that the personnel of the British Royal Air Force performing duties in connection with naval aviation should be classed in this comparison. Includes 4,157 Merchant Marine personnel manning auxiliaries such as tankers, yard craft, hospital ships, fleet service tugs, etc., which are manned in the U. S. Navy by regular officers and men.

b) Does not include 390 midshipmen at sea. Does not include approximately 260 civilians performing naval duties performed in U. S. Navy by regular officers.

c) Includes 1,369 retired officers of all ages and 277 retired enlisted men under fifty-five years of age.

d) Includes 7,324 retired officers of all ages and 19,020 retired enlisted men under fifty-five years of age.

X) Above personnel figures do not include Marine Corps personnel. The United States has 1,169 officers and 17,731 men in the Marine Corps, of which 64 officers and 2,113 enlisted men serve afloat. The British Empire has 448 officers and 10,029 men in the Marines, of whom 180 officers and 5,782 enlisted men serve afloat. Japan has no force corresponding to the Marine Corps of the United States and the British Empire.

		U. S.	BRIT. EMP.	JAP. EMP.	FRANCE	ITALY
ACTUAL RATIOS	Officers, Regular Establishment	4.69	5.00	4.26	1.97	1.26
	Enlisted Men	4.26	5.00	3.41	2.63	2.13
RATIO APPLIED TO CAPITAL SHIPS BY TREATY		5.00	5.00	3.00	1.67	1.67

Table II—Capital Ships (Limited)

Power	Scrapped Under Treaty Terms: Ships-Completed		Scrapped Under Treaty Terms: Ships-Building		Scrapped Under Treaty Terms: Total		Retained (X)		Tonnage to be Arrived at in 1941	True Ratio
	No.	Tons	No.	Tons	No.	Tons	No.	Tons		
United States	19(a)	289,580	13(d)	552,800	32	842,380	18	525,850	525,000	5.00
British Empire	22(b)	447,750	None		22	447,750	22(e)	580,450	525,000	5.00
Japanese Empire	12(c)	192,751	4	161,958	16	354,709	10	301,320	315,000	3.00
France	None		None		None		9(f)	194,544	175,000	1.67
Italy	None		None		None		7(g)	133,670	175,000	1.67

a) Includes *Delaware* and *North Dakota*, scrapped upon completion of *Colorado* and *West Virginia* in 1923. Includes *Oregon* and *Illinois*, permitted to be retained for non-combatant purposes.
b) Includes *Collingwood* and *Colossus*, permitted to be retained for noncombatant purposes.
c) Includes *Asahi* and *Shikishima*, permitted to be retained for noncombatant purposes.
d) Includes battle cruisers *Lexington* and *Saratoga*, which are to be completed as aircraft carriers.
e) Upon completion of *Nelson* and *Rodney* in 1926, *Ajax*, *Centurion*, *King George V. and Thunderer* will be scrapped, giving British Empire twenty capital ships of 558,950 tons displacement.
f) Battleship *France*, 23,500 tons, foundered in Quiberon Bay, August, 1922, thus decreasing the actual number of capital ships retained by the Republic of France as per Treaty from ten to nine.
g) The battleships *Leonardo Da Vinci*, *V. Emanuele*, and *Regina Elena*, were voluntarily scrapped in 1922-23, thereby reducing the actual number of ships retained by Italy as per treaty from ten to seven.
X) British Empire and Japanese Empire retain four battle cruisers each, United States retaining none. When *Nelson* and *Rodney* are completed, the following status will be obtained:

	U. S.	Brit. Emp.	Jap. Emp.	France	Italy
Capital Ships Armed with 13.4" Guns or Heavier	14	20	10	3	0
Capital Ships Armed with 12" Guns	4	0	0	6	7

Table III—Aircraft Carriers (Limited)

Power	Built(a)		Building		Totals		Totals of Non-Experimental Carriers		Total Tonnage Allowed By Treaty	Increment Necessary to Attain Allowance (f) Tons
	No.	Tons	No.	Tons	No.	Tons	No.	Tons		
United States	1	12,700	2(b)	66,000	3	78,700	2	66,000	135,000	69,000
British Empire	4	67,290	2(c)	37,200	6	104,490	3	56,300	135,000	78,700
Japanese Empire	1	9,500	2(d)	53,800	3	63,300	2	53,800	81,000	27,200
France	None		1(e)	21,160	1	21,160	1	21,160	60,000	38,840
Italy	None		None		None		None		60,000	60,000

a) All experimental, with exception of British carrier *Furious* of 19,100 tons completed September, 1925. Under terms of Treaty, experimental carriers can be replaced at any time, provided total carrier tonnage is not exceeded.
b) *Lexington* and *Saratoga* which were building as battle-cruisers, are to be completed as aircraft carriers.
c) *Courageous* and *Glorious*. In addition, one aircraft carrier is being definitely considered by Australia.
d) *Akagi*, formerly building as battle cruiser; *Kaga*, formerly building as battleship.

e) *Bearn*, ex-battleship.

f) Maximum individual tonnage of aircraft carriers is 27,000 tons. Most powers favor smaller carriers than this. General Board of United States Navy recommends immediate construction of one 23,000-ton carrier.

	U. S.	Brit. Emp.	Jap. Emp.	France	Italy
Actual Ratio, Aircraft Carriers built and building (tons)	2.91	3.87	2.35	0.78	0.00
Allowed Ratio, Aircraft Carriers, (tons)	5.00	5.00	3.00	2.22	2.22

Table IV—Modern Cruisers

5″ to 8″ Guns: 3,000-10,000 Tons; 27 Knots Plus—(Unlimited)

Power	Built No.	Built Tons	Authorized and Appropriated for, or Building No.	Authorized and Appropriated for, or Building Tons	Totals No.	Totals Tons	Tonnage on basis of 5-5-3-1.67-1.67	To Attain 5-5-3-1.67-1.67 Ratio with Britain No.(c)	To Attain 5-5-3-1.67-1.67 Ratio with Britain Tons
United States	10	75,000	2(a)	20,000	12	95,000	304,290	21	209,290
British Empire	38	179,190	13(b)	125,100	51	304,290	304,290	None	
Japanese Empire	16	82,210	9	73,995	25	156,205	182,574	3	26,369
France	3	16,734	6	53,619	9	70,353	101,632	3	31,279
Italy	8	30,784	2	20,000	10	50,784	101,632	5	50,848

a) The 68th Congress authorized eight 10,000 ton cruisers, appropriating for only two.

b) Includes two 10,000 ton cruisers building for Australia.

c) Number obtained by dividing tonnage by 10,000 tons, the maximum size cruiser allowed by Treaty.

Actual Ratios, Modern Cruisers	U. S.	Brit. Emp.	Jap. Emp.	France	Italy
Tonnage	1.56	5.00	2.57	1.15	0.83
No. Vessels	1.18	5.00	2.45	0.88	0.98
Capital Ship Ratio	5.00	5.00	3.00	1.67	1.67

Table V—Destroyer Type, First Line Vessels (Unlimited)

Power	Built				Authorized and Appropriated for or Building				Totals			
	Leaders No.	Leaders Tons	Destroyers No.	Destroyers Tons	Leaders No.	Leaders Tons	Destroyers No.	Destroyers Tons	Leaders No.	Leaders Tons	Destroyers No.	Destroyers Tons
United States	None		281(a)	334,684	None		None		None		281	334,684
British Empire	18(b)	31,310	183(c)	209,265	None		2	2,700	18	31,310	185	211,965
Japanese Empire	None		72	77,025	None		20	28,855	None		92	105,880
France	1	2,067	19	18,628	6	14,154	18	26,034	7	16,221	37	44,662
Italy	8	14,889	22(e)	18,839	None		25(d)	26,622	8	14,889	47	45,461

Characteristics: Destroyer Leaders, 1,500 tons plus; 27 knots plus.
Destroyers, 1st line, 800-1,500 tons; 27 knots plus.

a) Includes fourteen light mine layers, destroyer type. Nearly all of these 281 boats, which give the United States a preponderance in this type, were laid down during the World War in an emergency program to combat the German submarines; many of them are of hasty construction. Only 106 destroyers and six mine layers, total 112, are kept in commission.

b) Includes one mine layer. c) Includes one mine layer. d) Includes nine combined mine layers and mine sweepers.

e) Includes three mine layers.

Actual Ratios, Modern Destroyer Types:	U. S.	Brit. Emp.	Jap. Emp.	France	Italy
Total Combined Tonnage	6.88	5.00	2.18	1.25	1.24
Total Combined No. Vessels	6.92	5.00	2.26	1.08	1.35
Capital Ships Ratio	5.00	5.00	3.00	1.67	1.67

Table VI—Fleet Submarines, First Line
Over 1,000 Tons Each; 20 Knots Plus (Unlimited)

Power	Built		Authorized and Appropriated for, or Building		Totals		Tonnage on Basis of 5-5-3-1.67-1.67	To Attain the 5-5-3-1.67-1.67 Ratio with British Empire.
	No.	Tons	No.	Tons	No.	Tons		No.(g)	Tons
United States	5(a)	7,556(a)	4	(b)	9	15,556(f)	20,900	3	5,344
British Empire	8(c)	16,460	3(d)	4,440	11	20,900	20,900	None	
Japanese Empire	2	2,800	18(e)	26,280	20	29,080	12,540	None	
France	None		2	6,000	2	6,000	6,980	1	980
Italy	None		4	5,200	4	5,200	6,980	1	1,780

a) Includes *T-1*, *T-2*, and *T-3*, out of commission; engines failures.
b) Tonnage not available; includes one-2,119-ton fleet submarine, one mine laying submarine, and two cruiser submarines, all *V*-types.
c) Does not include three 1,600-ton monitor submarines, *M-1*, *M-2* and *M-3*. (Note *M-1*, lost November 12, 1925.)
d) Includes two 1,480-ton submarines building for Australia.
e) Does not include three 1000-tonmine layers.
f) Estimated only on average basis of 2,000 tons per ship for ships building.
g) Number arrived at by assuming an arbitrary boat tonnage of 2,000 tons.

Actual Ratios, Fleet Submarines:	U. S	Brit. Emp.	Jap. Emp.	France	Italy
Tonnage	3.72	5.00	6.96	1.43	1.24
No. Vessels	4.09	5.00	9.09	0.91	1.82
Capital Ship Ratios	5.00	5.00	3.00	1.67	1.67

Table VII—Submarines, First Line
700 Tons Plus, 13 Knots Plus (Unlimited)

Power	Built		Authorized and Appropriated for, or Building		Totals		Tonnage on Basis of 5-5-3-1.67-1.67	To Attain the 5-5-3-1.67-1.67 Ratio with British Empire
	No.	Tons	No.	Tons	No.	Tons		No.	Tons
United States	50(a)	43,822	None		50	43,822	25,340	None	
British Empire	26(b)	23,560	2	1,780	28	25,340	25,340	None	
Japanese Empire	41	32,838	4(c)	3,659	45	36,497	15,204	None	
France	15(d)	12,993	18	13,281(e)	33	26,274	8,463	None	
Italy	10	7,902	8	6,340	18	14,242	8,463	None	

a) Includes *S-21* sunk September 25, 1925.
b) Does not include three 1,600-ton monitor submarines, *M-1*, *M-2*, and *M-3*. Does not include three mine layers totalling 2,670 tons.
c) Does not include three 1,000-ton mine layers.
d) Does not include three mine layers totalling 2,988 tons.
e) Does not include tonnage of seven ships, details unknown

Actual Ratios, Submarines, 1st Line..	U. S.	Brit. Emp.	Jap. Emp.	France	Italy
Tonnage	8.64	5.00	7.20	5.18	2.81
No. vessels	8.93	5.00	8.03	5.89	3.21
Capital Ship Ratios	5.00	5.00	3.00	1.67	1.67

Table VIII—Naval Air Strength (Unlimited)

A. Data on Plane-Carrying Capacity of Fleets. The following table indicates the airplanes which it is estimated may be carried and launched for effective attack by combatant ships of the fleets at sea, away from a coast defense area of 1,000 miles.

Power	Plane-Carrying Capacity—Built		Plane-Carrying Capacity—Building		Total	Plane-Carrying Capacity on Basis of 5-5-3-1.67-1.67	To Attain the 5-5-3-1.67-1.67 Capacity with British Empire(b)
	Aircraft Carriers	Battleships and Cruisers	Aircraft Carriers	Battleships and Cruisers			
United States	30	74	144	4	252	468	216
British Empire	162	116(a)	144	46	468	468	None
Japanese Empire	26	42	144	18	230	281	51
France	0	27	72	12	111	156	45
Italy	0	30	0	4	34	156	122

a) Does not include capacity of four battleships to be scrapped in 1926.

b) Possible to attain capacity by (1) building large aircraft carriers to total tonnage allowed by Treaty, (2) building cruisers to carry planes, cruisers not being limited as to numbers, and (3) building carriers of less than 10,000 tons displacement, these being unlimited by Treaty.

Actual Ratios, Naval Air Strength:	U. S.	Brit. Emp.	Jap. Emp.	France	Italy
Plane Carrying Capacity	2.69	3.00	2.46	1.19	0.36
Capital Ship Ratios	5.00	5.00	3.00	1.67	1.67

B. General Data Regarding Naval Aviation

	United States	British Empire	Japanese Empire	France	Italy
Heavier than Aircraft in commission exclusive of school and training.	218	116(a)	148(X)	84	(b)
Heavier than Aircraft in Reserve	180	100%	305(X)	96	(b)
Personnel: Officers	709(c)	476(d)	400(X)	210	(e)
Enlisted Men	4,537(c)	2,871(d)	3,500(X)	3,500	(e)
Reserve	412	(f)	(f)	(f)	(f)
Lighter than Aircraft					
Built	5(g)	4(h)	2	6	6
Authorized	None	2(i)	1	None	None

a) Fleet Air Arm. (544 additional planes in general service in Royal Air Force.) (b) Naval planes are in general Army and Navy service. Planes in active General Service number 605; in Reserve, 467.

c) Includes Marine Corps personnel.

d) This figure is not accurate as a basis of comparison, as it does not include administrative and other overhead personnel of the Royal Air Force which serves the Fleet Air Arm. An estimate of personnel required by the British Empire for naval aviation separately is: 1,024 officers and 8,939 men.

e) Included in General Service, which has 767 officers and 16,716 men.
f) Information not available.
g) Includes the non military rigid *Los Angeles* of 2,764,461 cubic feet, 3 small nonrigids, and 1 small semi-rigid.
h) Large rigid type.
i) Both of 5,000,000 cubic feet; one eventually for commercial use.
X) Estimated from available data; no official data available.

Table IX—Vessels Laid Down or Appropriated for Since 6 February 1922

(Date of Washington Conference Limiting Naval Armaments)

Type	United States			British Empire			Japanese Empire			France			Italy (f)		
	Laid Down	Appro. for	Total	Laid Down	Appro. for	Total	Laid Down	Appro. for	Total	Laid Down	Appro. for	Total	Laid Down	Appro. for	Total
Battleships	..	..	..	2	..	..2	..	..	..	..	..	..	..	..	..
Aircraft Carriers, 1st line	2(a)	..	2	2	(b)	2	2(c)	..	2	..	1	1	..	..	..
Light (Modern) Cruisers, 1st line	..	2	2	7(d)	4	11	12	..	12	5	1	6	2	..	2
Cruiser Mine Layers	..	..	..	1	..	1	..	1	1	..	..	..	..	..	..
Destroyer Leaders	..	..	..	..	..	..	..	..	..	6	3	9	..	..	..
Destroyers	..	..	..	2	..	2	24	11	35	18	4	22	16	..	16
Submarines (all classes)	1	2	3	3	..	3	19	11	30	23	9	32	12	..	12
Gunboats	..	6	6	..	4	4	4(e)	..	4	..	..	..	..	..	..
Mine Sweepers	..	..	..	..	..	..	6	..	6	..	..	..	9(g)	..	9
Submarine Tenders	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..
Tankers	..	..	..	..	..	..	3	..	3	1	..	1	4	..	4
Supply Ships	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..
Totals			13			25			96			71			43

a) The *Lexington* and *Saratoga* were authorized by the terms of the Washington Conference to be converted into Aircraft carriers, and are included in these tables.
b) Table does not include one aircraft carrier (of about 6,000 tons) being considered by Australia.
c) *Akagi* and *Kaga* were authorized by the terms of the Washington Conference to be converted into aircraft carriers, and are included in these tables.
d) *Emerald* and *Enterprise* were laid down prior to Conference and are not included in these tables.
e) These are river gunboats.
f) No definite information concerning building program under consideration.
g) Are both mine sweepers and mine layers.

Table X—Projected Building Programs of Foreign Powers

(Additional to Ships Building in Preceding Tables)

British Empire:	Five-year program—nine 10,000-ton cruisers: seven 8,000-ton cruisers; twenty-seven first line destroyers; twenty-four fleet submarines; five gunboats; four patrol vessels; two submarine tenders; one repair ship; one net layer.
Japanese Empire:	Five-year program—(Note: Following program proposed by Japanese Navy Department. It is believed that a cut will be made by the Government in this program, or a compromise reached, because of the financial depression existing in Japan.)—four 10,000 ton cruisers; twenty 1,500 ton destroyers; ten 1,500 ton fleet submarines; three gunboats; one aircraft tender; two special service ships.
France:	Five-year program—three light cruisers; eighteen first line destroyers; fifteen destroyer leaders; two mine layers; two fleet submarines; twenty-one first line submarines; six first line mine layers; four oil tankers; one submarine tender.
Italy:	Proposed—Under Consideration—three light cruisers; eight first line destroyers; eight submarines.

DISCUSSION

Paper Work

(See page 294, February, 1926, PROCEEDINGS)

REAR ADMIRAL W. L. RODGERS, U. S. NAVY, Retired.—I think the paper is a valuable one. The increase in paper work which is growing so fast in the past few years is to my mind an evidence, among others, of a growing inefficiency and lack of discipline in the Navy.

If admirals were to make their staff work by frequent helpful inspection there would be no need of so much paper work. In this connection, I think that too many admirals regard the visit of a gunnery or an engineer staff officer to a ship as one made for the information of the admiral only. If it were made for the help and information of the ship captain also, much better results would be reached.

Every staff officer visiting the ship should be required by the admiral to place himself at the service of the captain of the ship to help him. The formal admiral's inspections are somewhat different, but there also the inspection should be undertaken in a cooperative rather than in an antagonistic spirit, as is often the case, when the admiral fails to give this point careful attention.

If this were done the paper work could be cut down to advantage. Paper work is properly for record only, but in the last few years, we have grown into the habit of making it take the place of personal and ocular inspection and it is failing to get results.

Post Treaty Naval Design

(See page 2125, November, 1925, PROCEEDINGS)

COMMANDER E. G. ALLEN, U. S. NAVY.—TYPES ORTHODOX AND UNORTHODOX.—The Bywater and Prendergast article on types in the November number of the PROCEEDINGS makes an interesting story of a so-called *Indomptable* class projected as the next French capital ship mounting twelve-inch guns; and Bywater's October article in the *Scientific American*, paraphrased in the notes of the November PROCEEDINGS, is a release on the probable characteristics of the *Rodney-Nelson* class, the post treaty capital ship conception of the British designers with a battery of nine sixteen-inch guns disposed in three triple turrets in the bow. The writer cannot see the articles turned loose on the young thought as evidencing post treaty capital ship design without sounding a warning about the neighbor's green apples being bad for small boys. Certainly, both classes of ship look like green apples on this side of the water.

After all, innumerable considerations govern the laying down of naval types, considerations foreign and domestic in relations political, economical, and military, colored by the past, the present, and the visioned future. Our competitors have their own limitations in facing design. Usually one builds upon what one has as a naval instrument, as one can, with one eye on the instrument of one's competitors, the viewpoint narrowed by some traditional or accepted school of thought as to the national policy and how the Navy is to carry it out, strategically and tactically.

We were very conservative builders of types in the last generation of our Navy. During the Roosevelt period of influence, the Victorian period of our country, our admirals always hung hard to the idea we needed big gun strength to watch for a decision, and prior to the World War, in trying to make a lean purse purchase the most essentials, they were less concerned about the balanced fleet than in keeping up a battle line strength that would compare favorably with the leading navies abroad. Our politicians as a rule always leaned to a defensive Navy, but the Navy itself leaned to the blue water school of thought.

The 1916 building program, an eleventh hour insurance taken out by a rich nation confronted with a world conflagration, would have given us a 1916 post-Jutland conception of a balanced blue water fleet. Our entry into the war suspended this program, but our war construction secured us large additions of material, notably destroyers and coast defense, or cruising submarines.

When the war was over our authorized building program was an eyesore at home and abroad. It was used as a pawn to help force the League of Nations, and later was sold at auction as a political compromise to American voters in warding off a League of Nations entry, in reducing taxes by naval disarmament, and in quieting pacifist and foreign peace propaganda. Out of the wreck we saved ten scout cruisers, some submarines and auxiliaries, and two battle-cruiser hulls converted into the aircraft carriers *Saratoga* and *Lexington*, and the *Colorado* and *West Virginia*.

The fiscal year 1926 as a result of the treaty sees us with curious limitations on types, armament, and tonnages in relation to our competitors. The problem of type construction is now circumscribed by arbitrary rules, as to capital ships in total tonnage and caliber of gun, as to carriers in tonnage, as to cruisers in individual tonnage and caliber of gun. Unrestricted tonnage is available as to submarines and as to surface types of less than 10,000 tons and not exceeding eight-inch guns. No unknown element not weighed in a modern war at sea exists except the effectiveness of aircraft at sea in facility of employment from floating base and effectiveness of employment in the face of defense measures. Having laid the immediate background of where we are and how we got there, the next step should be to discuss where we are going and why. For the moment, let us discard the practical condition and theorize on the reason for types.

Navies in general as you look at them seem to fall in two general types, the aggressor type and the defensive type. The first is the go-get-'em or blue water type, and the second the hold-'em-back or regional-defense type.

The first type usually goes with a composite of insular position, large sea trade, rich colonies, insular economic insufficiency of raw materials or food, wealth, manufacture; the second with continental position, small trade, few colonies.

Whether the kind of Navy is a result of the geographical or economic condition, or vice versa, matters little. We see them as they exist. Great Britain may have been made by the blue water school or the blue water school made by the British Isles; France may have been made by a regional defense or the regional defense by the geographical and economic position of France. The necessities of living give us strange bed fellows; make strange bed fellows of us. Fortunately for the United States life is not all necessities. We, moreover, have no bed fellows of military strength. We are rich, self-contained. There can be some naval volition in relation to the present and much for the future despite the naval disarmament treaty.

What I would like to develop is that the United States by virtue of the generosity of providence and geography, and, by good luck, has only binding it the necessities of its own self-imposed restraints as to purse and treaties in determining whether its interest is not best served by the blue water school and a blue water Navy. The American naval officer by training is of the blue water school. The fleet is organized about the concept of blue water employment. The Naval War College is a school teaching the blue water theory of naval warfare. We are blue water sailors by design and not by force of economic pressure. We have given the United States what we thought it needed and not what its politicians wanted it to have.

We can now go back and pick up the thread of thought as to where we are going and why in relation to the fleet and its types. At this point there must be introduced those two poor old battered stage props, gaining control of the sea and exercising control of the sea—the big fight and the mopping up of the ocean of enemy commerce and raiders. They are the symbols of the creed of the blue water sailor.

In looking at the problem, one finds in provision for the big fight our punch is now by treaty restricted as to total tonnage and caliber of gun of capital ships, and for mopping up we lack all classes of cruisers. Since the naval conception is still that the high seas' battle hinges or revolves around the units carrying the big gun, the relative weights and distributions of gun, armor, machinery, and fuel in capital types is most important, in fact, determines their chief tactical characteristics. To allot these weights you must have some theory of how you are going to bring on and fight your battle. All other types serve some purpose of bringing the stag to bay, but the killing is done by the big gun in a major action. No type, however, should be constructed without carefully planning its place in the whole. The accepted disposition for battle is that the mobility of modern capital ships of the same characteristics of necessity results in the capital units fighting in a line parallel to the enemy's line, giving maximum effectiveness of fire, gaining victory measurable by attrition of gun fire. Yet no major naval battle of modern or other time has held to the rule absolutely.

Tactical conception of the parallel battle, while sound, is not the usual arrangement; just the ideal solution. A straight line is the shortest distance between two points, but not the only or the usual way to get there. The moral to draw from this is that, so far as battle tactics of the main line and tactical characteristics of main units are concerned, we must be ready to fight with the gun from any formation or no formation and over any relative ship bearing. When the *Rodney-Nelson* class is measured by this standard we can question a type, despite its gun power, that is designed either with a preconceived idea of the relative bearing its guns will be fought on and in which tactical flexibility of maneuver is sacrificed to magazine protection. The type has probably been conceived as the arrow-head of the British main line, but a reversal of course after deployment would put the arrow-head in difficulty so far as its speed is concerned. A gunnery expert would be bothered with the problem of divided fire by such a type.

The German conception was that the design should provide a ship that could stand continued punishment and outlast the enemy in the main line. A new school of thought now develops, which is that tactical flexibility must be sacrificed to the same purpose.

The *Rodney-Nelson* class must always be operated with support, as, operated alone, divided action or a superior force against it will always find it weak. If operated alone as support for the advance, it is tactically inefficient for a retiring action. Let us hope our competitors build many more of them. Materially it is a good ship to build; tactically it has a weak case. Before the advent of battle cruisers, destroyers, submarines, and air in the high seas engagement, the parallel battle without radical group or individual maneuver had some basis of certainty. With a modern fleet composed of all types, each carrying a weapon that necessitates maneuver to avoid it, to believe implicitly in the rigid line is to believe in fairies; and for navies to prove it by *Alice in Wonderland* peace-time evolution is I presume, to produce operators who give us Jutlands and tacticians who permit designers to give them *Rodney-Nelsons.*

Whatever a blue water sailor may think of imposing tactical limitations on the employment of the major caliber of gun allowed on capital ships, it requires an extraordinary departure from the blue water school of thought to visualize the regional-defense conception of disposing its capital ship treaty tonnage in an *Indomptable* class with twelve-inch guns. If the thought is to design a commerce destroyer with the ability to hit and run, the blue water sailor logically would proceed somewhat as follows: Required, no major action; mission, commence destruction; employment, unsupported. The package to conform this formula must outrun any cruiser of capital gun strength and, if possible, outgun it in astern fire. The design would call for 36 or more knots and at lest four six-inch guns astern. If built to polish off the 10,000-ton eight-inch gun cruiser the same armament would be required ahead. A combination of both arrangements is the *Glorious, Furious* type of Lord Fisher. The designed ship is discussed as about 35 knots with an echelon arrangement of twelve inches. Such a

ship cannot be projected against Great Britain or Japan who possess battle cruisers with sixteen-inch guns, and the only nations the type could be effective against would be Italy or ourselves. The submarine operating from shore bases in the Mediterranean could dispose of the problem of stopping Italian commerce, so the effectiveness of the projected ship is only absolute in the field of operation against the United States. It is likely that the projected type is the usual abortion that results from deducing types to serve a regional-defense idea, but the designer should congratulate himself that the type would, by chance, have one practicable field of operation on blue water.

The importance of considering new major ship design abroad is that eventually we must replace our capital ship units. As blue water sailors, we naturally will mount the sixteen-inch gun, but is the new type to be a battleship, a battle cruiser, or a combination of either type with gun and air as weapons By logic and experience we can dispose of the two or multifunction ship if designed to fight only in the line, as air does not as offense belong in a ship designed to stand punishment in the line. True, such a ship should be as self-contained as possible for offense and defense, necessitating a broadside battery, anti-aircraft battery, spotting and, perhaps, fighting planes, but space and weight should serve to give full offensive use of the gun and keep afloat the platform carrying it. The bombing aircraft belong on the carrier.

Replacements of capital units of the fleet must, however, be made with one eye on the material of the competitor and one eye on our own. Tactically the United States Fleet is weak for the operations leading up to major action as it has no fast, strong support for its advance comparable to Great Britain or Japan. We have no battle cruisers. This gives the paradox that the advance cannot be advanced. In other words the scouting force must be supported by more capital ship strength than the total of enemy battle cruisers, and, if it is, the main body must be close behind lest the advance meet the enemy's full strength. In effect, the United States Fleet is blind as a mole unless great risks are run in losing advanced units, or unless the enemy does not employ his tools to advantage. Of course, air scouting is of some use in overcoming a lack of support in that information may within certain limitations be obtained without fighting for it.

Our decision then in making replacements hinges on whether we build battle cruisers or battleships. Shall we sacrifice endurance and power in the line, or shall we sacrifice strategical and tactical initiative as secured by high speed and big gun support for the advance force or a fast wing? On a five-three basis we can vote for a division of cruisers, on a five-five basis we have a dilemma. The fighting strength of the whole fleet must be weighed—the weight of each arm, its probable proficiency, the strategy of the probable campaign, the chance of a fleet engagement, can our destroyer strength be effective without a fast wing to work on the enemy's? My vote would be for the battle cruiser division both to secure ease and room in employment in preparing for battle and to make the van flexible, fast, and strong in giving battle. It is vital that the water over which the fleet is to

pass is clear. It can never be clear if an enemy's fast wing with proper light forces is operating for any length of time on the van of our present fleet composition. On a normal day the admiral of the United States Fleet would be forced to frequent maneuver or to a reversal to get rid of difficulties in his van. He would be Von Sheer at Jutland, always in a hole as to the tactical situation, compelled to resort to constant maneuver to keep out of trouble.

When the battle cruiser is considered for work with the advanced force, the case for the combined gun and airplane ship is better taken. The ship operates by itself or in a small unit close to the enemy's advance or main body. It may run into a carrier. Its function is to push in the enemy's advance and find what is behind it. What shall its air be, defensive or offensive? Even in this case I think that space given to air should not encroach on the gun but that fighting aircraft and light bombers should be provided; the first type for defense, the second for carrier decks.

The offensive weight that air will have at sea will depend upon its applicable offensive power. It has been considered good ball in our Navy by a certain element to overstress the value of the air functions at sea. The reason was that it was felt the arm had potential naval value and political power and should be exploited and brought up. The Naval War College has been the chief stresser. Among many others I have spent a certain part of my time at the same thing. The proper period for overstressing by design to my mind is over. It is time air rested on its merits since it is now in the fleet. However, notwithstanding the stressing and the stressers, it must be kept in mind that unless offensive air on the high seas (big bomber and torpedo planes) is effective the whole case of aircraft at sea is what is known as a flop. There has never been a type carrying an offensive weapon at sea as inherently weak as the carrier, for the capacity for using its weapon rests upon the integrity of a light wooden deck. There has never been a type carrying an offensive weapon sent to sea in which the employment of its weapon was so laborious and difficult in preparation, and so dependent upon sea and weather when measured not in terms of a single plane, but of volume of fire. There has never been a weapon used at sea by surface ships which had to be carried in for use so close to the defense by guns and aircraft as the bomb. There has never been a weapon used at sea so slow in hitting as an aircraft bomber when measured in terms of rounds of fire by squadrons or single units.

Great mobility and a small three-plane target is the point on which the aircraft has received its chance to prove its case at sea.

Every other factor is against it. For main action then, offensive airpower at sea promises to be a fine weapon, granted a succession of "ifs" that do not apply to any other tools used at sea except, possibly, the floating mine. It is the most expensive weapon in dollar cost as measured in dependable hits that a navy has ever packed on the high seas.

The analogy of air in the late war does not apply at sea. When armies are immobilized in trenches for long periods and lines of supply, hangars, flying fields, and so forth, are constructed, obviously air bombing is a useful

and readily applied weapon within its field of effectiveness. If armies are mobile, the air is less effective, as it needs a huge supply and engineering service to make it work.

At sea, battle or preparation for battle is not a question of months, but of hours. If the air is not usable when you want it, and within the minutes you want it, it is useless. There is never any immobilized period in a high seas naval battle, the decision is there obtainable and measurable by seconds if both sides want to fight. It can be procured by gun, torpedo, or even ramming. The drawn naval battle was conceived as impossible with modern naval arms until Jutland. Jutland was a drawn battle due, not to inability of the tools to secure a decision, but an inhibition, a reluctance to use the tools to force it.

The case for air bombing in a sea battle rests upon the ability to fly off squadrons of heavily loaded bombers from the rear of a carrier's deck, preceded by squadrons of fighters from the bow. All units must be on deck ready as the preliminaries in preparing for such operations take hours. Once off the formation must gain altitude. To be employed it must pass a defensive wall of aircraft and gun fire. To be utilized again it must return, lose altitude, land in turn successfully, be reloaded, and repeat the process. A fifty or a one hundred-pound bomb at any time during this period on the carrier deck puts the entire show out of action. The same may be said for a shell of any caliber.

The most ardent and vociferous advocates of airpower at sea are retired officers who have never seen a carrier or an airplane used in its sea environment.

The big case for airpower at sea has been built up largely of theories by visionaries of the armchair brigade of ex-sailors. The practical case has been advanced by active line officers who wanted to see it have a run for its claims. Now that air is getting at sea, I conceive the time has arrived to stop kidding the Congress, the public, or ourselves about its possibilities and to let the toddling infant walk on or fall, as it may, from its own feet. It is time to stop romancing about air at sea and to look at it as it is.

The same to my mind applies to the utility of aircraft spotting. A cumbersome control system has been built up premised on the assumption of the parallel battle. To measure the system against the practical case, read the battle of Jutland, and transpose, in thought, our aircraft fire control system on this melee of intermittent shifting fire, maneuver, and scattered targets. Again, I am not decrying aircraft spotting, but would make the point that we should not deceive ourselves about aircraft spotting, or come to rely upon it too much for action. Confusion or maneuver may, at any time, make it useless. What game board rule can you evoke that will deny an enemy the right to maneuver? The field for aircraft spotting is the preliminary part of a fleet action that has opened by normal deployment and commenced in a given time period in parallel columns. It must be assumed the action will take place within certain time limits after the spotters take the air, that the enemy will give you the engagement within the period.

Again the "ifs" have it, and reliance on "ifs" is bad for naval commanders. Enough "ifs" make the case that never happens, that is why the ideal of parallel action is never realized wholly in practice. It is a game board condition of theoretical values. Absolute belief in it and years of training at it will congeal the brain cells so that on the day of battle the commander is impotent to act when his rules won't fit the vagaries and disorders of battle.

Personally, I think the time is over to proselyte for air in the fleet as, with our new carrier tonnage and catapults, we will be more than overdone in the air for battle. The enemy has a restricted tonnage and can carry no more air than we can. The effectiveness of the weapon for attack is unknown. Fighting plane provision and light bombers for use against carrier decks would insure defense on the high seas.

The replacement of our next capital ships will necessitate an important decision as to type and characteristics. Do we continue on battleships or shift to battle cruisers? The time is ripe to start discussing the subject and to kill off any patter that might lead us to *Rodney* or *Nelson* arrangements, to a combined gun and airship as a battleship, or to a twelve-inch gunned battle cruiser. It is my opinion we should attempt to get to sea a division of ships with at least 35 knots mounting a sixteen-inch battery in the conventional centerline bow and stern arrangement, one mast, at least six catapults, mounting a flight of spotting, a flight of fighting, and a flight of light bombers.

With a division of such ships and the projected 10,000-ton cruiser class we will possess a balanced fighting implement that can be made to function tactically in the blue water operations preliminary to and during a high seas battle.

Post Treaty Naval Design

(See page 2125, November, 1925, PROCEEDINGS)

CAPTAIN E. F. EGGERT, (CC), U. S. NAVY.—The writers have given us an interesting story, and have shown the uses of a vessel of the type the French are said to be contemplating. A few of these points are not readily acceptable.

The use of such a vessel in the Mediterranean, a narrow sea where distances are short, and strategic areas are small, would seem to be very logical. This is especially true when the vessel is used as a support to smaller vessels. On the other hand, to send out on a lone mission a vessel as expensive as this type would be, where no support could be counted on, where she is exposed at all times to accidental meeting with forces she cannot face, where no object can be attained but to destroy a limited amount of commerce, with perhaps a few unlucky cruisers, does not seem so logical.

The chief point in the argument to prove the immunity of this type from enemy attack is that concerning the speed of 34 knots. Paper speed is one thing, actual sea speed at a given time is quite another. It may be that in certain cases the 10,000-ton cruiser type becomes "simply helpless prey."

But on the other hand, in a stern chase, or in open water, there should be no great difficulty in such a cruiser getting away, seeing that the usual designed speed is 35 knots, and with a length of about 600 feet there should be no great hindrance in a moderate sea to attaining at least as high a proportion of this paper speed as is reached by the larger cruiser.

But if there are conditions that reduce the paper speed of the light cruiser to the point where she might be caught by the proposed type vessel, there also are conditions under which the speed of the new vessel will be reduced to the point at which she will be subject to being overhauled by a *Renown,* though the paper speed of the latter be two knots less. But aside from a plain case of a stern chase and a long chase, there are many chances at sea against such a vessel, if hunted by a *Renown.*

The pursuer will not trust to accident in bringing the quarry to book. If the cruiser is working in one locality for any length of time, there will be a plain trail to follow, and the pursuer will appear unexpectedly. Some unlucky dawn will suddenly reveal the *Renown* coming up fast out of the dark west, when perhaps the *Indomptable* is stopped to overhaul a merchantman, or to take on oil from a captured tanker. Again, it cannot be the policy of such a raider to run at any alarm. Part of her job is to destroy light cruisers if she can. Any vessel appearing must be scrutinized carefully to determine whether it is within the class she can fight, and, until this is done, to run is to fail in her mission.

Thus, at any time, she may find herself within say 10,000 or 15,000 yards of her formidable pursuer, and to get out to 25,000 yards or more, where she may be beyond reach and able to indulge in the heroics of "insulting" her pursuer by straddling her with a salvo, will take, under the probable conditions, two hours or more. This is just plain arithmetic. With a difference of speed of two knots she can open out the range by not more than 4,000 yards in an hour. Even in an hour there should be no difficulty, given the assumed good visibility, in ending her career. Any one hit will be the unlucky hit.

A *Renown* coming up, when looking for such an enemy, will not have to use caution. She can take a chance that the vessel sighted is the one sought, and can work up to full power while still beyond the distance at which her own character can be determined. The *Indomptable* cannot afford to burn much fuel on the chance that full speed will be needed to escape, and if she has reached the point where she must run whenever a newcomer is suspected of being Nemesis, her career will soon be ended. The time required to turn to run, and the full view she thus gives of herself, will be a handicap.

Even if not pursued by a *Renown,* fatal damage may, at any time, be received in an attack on an unarmored cruiser. The type vessel is in no way immune to torpedo attack. Even slight damage might reduce her speed to the point where she could neither catch a cruiser, nor escape from a battle cruiser. If near an enemy base, she would be subject to destroyer attack. Decoy vessels might mean her ruin. Altogether, her life would not be all roses.

If this vessel is intended for nothing but fighting light cruisers and taking merchantmen, why should she be armed with twelve-inch guns? Against either, the eight-inch gun is enough, and if substituted, would allow considerable addition to the protection, or to other features. The presence of the larger gun indicates that she is intended primarily for capital ship work, and her use for commerce destroying would be only secondary, and would in fact be a diversion from her proper duty that would be indulged in only because of the lack of other objective.

There is another matter in this paper that requires comment. It is stated on page 2134 that "within the maximum quota of displacement . . . . a vessel armed with six fourteen-inch . . . . driven at 36 to 37 knots with engines of 240,000 s.h.p., and protected by eleven-inch to five-inch waterline armor, five-inch decks, and twelve-inch to nine-inch gun positions." To drive a vessel of this displacement with a s.h.p. of 240,000, and to attain a speed of 36 knots, will require a hull of about 900 feet length. To carry the battery and armor specified, with the usual American standard of hull and machinery characteristics, will be impossible, and it will be necessary to reduce the strength of hull, or the weight of machinery, or both. To retain the present standard, the side armor would have to be cut below six inches in average thickness. Of course, the armor could be reduced by making it unusually narrow, but that could hardly be advocated in these days. It should be noted that the five-inch decks alone would weigh over 5,000 tons, and the weight of the armament and protection would be in the neighborhood of 13,000 tons. This approaches the relative weight allowed for these items in a slow battleship rather closely.

To design this vessel for 37 instead of 36 knots is quite another matter, and one would hardly recognize the proposition in the final result. The armor would entirely disappear.

The statement also is made that the fourteen-inch armament is preferable for, with 35° elevation, the twelve-inch guns of the *Indomptable* would be outranged by several thousand yards. The presumption is natural that the short fourteen-inch gun is meant, since an alternative of the thirteen five-inch long caliber inch is also mentioned. This gun at 35° elevation would not attain over 35,000 yards range. The gun of the *Indomptable* was stated to be of a new high velocity model, with shells of 970 pounds weight, 100 pounds more than the standard. The gun indicated would hardly have less than 2,800 foot seconds velocity at the muzzle, and with 35° elevation would outrange the low power fourteen-inch gun by several thousand yards, instead of being itself correspondingly outranged, as is stated in the paper.

Vest Pocket Ballistics

(See page 2138, November, 1925, PROCEEDINGS)

CAPTAIN E. F. EGGERT, (CC), U. S. NAVY.—The formulas given by Lieutenant Wright seem simple, but it takes a considerable time to work them out, and not so very much time is saved after all, over that required

for the usual methods, considering the low degree of precision of the results.

To test the accuracy of the formulas, comparison was made with a trajectory already on hand, that of the sixteen-inch-2600 f.s. gun, with coefficient of form of .69, at an angle of elevation of 12°-52′, and the results are as follows:

	Computed	Actual	Error, Per Cent
R	22400	19920	12
Y	5120	4123	24
T	35.8	32.0	12
R max.	42900	39000	10

Incidentally, the angle for maximum range is not 45°, but about 49°, though the difference in range at the smaller angle is not great.

The formulas appear to indicate that the range is a linear function of the initial velocity. This is not by any means exact. When the velocity is increased to 2,800, for instance, the maximum range is increased to 44,200, an increase of 13 per cent, though the increase of velocity is less than 8 per cent.

Navy Day

(See pages 1817, 1825, October, 1925, Proceedings)

Major Edwin N. McClellan, U.S.M.C.—Misstatements of historical facts, no matter how innocently or unintentionally they may be made, always bound back to haunt and embarrass us. The Navy already has several such and we should make every effort to keep the list at a practical minimum. We can be forgiven for errors creeping into our recorded history when the obvious facts are "colored" a bit by our friends; but when *we* ourselves thoughtlessly, or otherwise, err in this regard we will have to throw ourselves on the mercy of the court some day in the future as the boomerang returns home.

In a recent number of the Proceedings there appeared these two sentences:

It was also on October 27, 1775, that a special committee presented to the Continental Congress a bill providing for the construction of the first ships of the Navy.

October 27 is also the birthday of the American Navy because on that day in 1775, the first resolution to authorize American warships was introduced into the Continental Congress, which measure was passed three days later.

If the Navy is going to have a formal birthday we might as well have as ancient a one as the facts permit, and in a spirit of constructive effort the following résumé is given.

On August 26, 1775, the Rhode Island Legislature in writing instructed its representatives in Congress to propose the establishment of a Navy "at the Continental expense." The subject of forming a Continental Navy was first brought to the attention of Congress on October 3, 1775, when these Rhode Island members presented their instructions. It was not until Octo-

ber 5, 1775, that a committee, formed of John Adams, John Langdon, and Silas Deane, was authorized and later appointed, and General Washington directed to secure two armed vessels from Massachusetts, and so forth, place them "on the Continental risque and pay" and use them to capture two unescorted brigs, loaded with munitions of war that had sailed from England. Washington also was instructed to give orders for the "proper encouragement to the marines and seamen" that served on these vessels.

Then, on October 13, 1775, Congress directed that two vessels be fitted out. On this date a Naval Committee of three was appointed. On October 30, 1775, two more vessels were ordered to be fitted out, and the Naval Committee increased to seven members of which John Adams was one. This committee was called "the Committee for fitting out armed vessels," occasionally the "Marine Committee," but more frequently the "Naval Committee." This committee, however, should not be confused with the various committees or boards that succeeded it.

All this was the beginning of the Continental or Regular Navy and Corps of Marines as far as matériel is concerned.

On November 2, 1775, Congress authorized the Naval Committee to "agree" with such officers and seamen as are proper to man and command the four vessels—*Alfred, Columbus, Cabot,* and *Andrea Doria*—that had been authorized.

Continental Congress exercised both legislative and executive functions and did not delegate to the Naval Committee authority to "commission" the higher ranking naval and marine officers. On November 5, 1775, the committee "appointed" (as the President appoints officers today) Esek Hopkins as commander-in-chief, which appointment was confirmed with a commission on December 22, 1775.

November 10, 1775, is celebrated by the Marines as their birthday because on that date Continental Congress passed a resolution authorizing an organization of marines. By every resolution of Congress, concerning the manning of the vessels for the Continental Navy, Congress had authorized marines, for marines were as much a part of the crew as seamen. This resolution of November 10 went further than merely authorizing marines; it provided for an organization of them.

On November 25, 1775, Congress considered some legislation which in the opinion of John Adams was "the true origin and foundation of the American Navy," and in producing which he "had at least as great a share" as "any man living." It is presumed that this legislation was that later passed of date November 28.

Samuel Nicholas was commissioned "Captain of Marines" on November 28, 1775, and that original commission is still in existence. It is safely preserved by his great-great-grandson.

On this same date, the twenty-eighth, the Rules for the Regulation of the Navy were adopted by Congress. On this date Congress used for the first time the term "Navy of the United Colonies." It was not until December 2, 1775, that the form of a commission for naval officers was adopted by Congress; but notwithstanding this, the commission of Captain

Nicholas dated four days before still exists. On December 2, 1775, Congress authorized two more vessels. On December 5, 1775, Congress fixed the compensation of recaptors. Two days later Congress established grades of midshipman, armorer, sailmaker, yeoman, quartermaster, quarter gunner, cook, and coxswain. On December 13, 1775, the wages of able-bodied seamen were set at $8.00 a month. On December 22 of the year 1775 the Naval Committee laid before Congress a list of the officers they had agreed with (or "appointed") and Congress *confirmed* the appointments of the Committee.

Washington's fleet around Boston, the armed vessels on Lake Champlain, and the war vessels of some of the state navies, all antedated the beginning of the Continental Navy. Many isolated instances where American citizens rose *en masse* and acted in a naval status preceded the beginnings of our Regular Navy. Among such were: recapture by New Bedford people of two American sloops that had been captured by the *Falcon;* capture by armed schooner *Volante* (tender to British frigate *Scarborough*) by Martha's Vineyard Americans; capture of the British warship *Margaretta* at Machias, Maine; incident concerning the British armed schooner *Diana* near Boston. Then there was the capture of an armed tender of the British frigate *Rose* by the Rhode Island navy ships and the capture of a British supply vessel at Savannah by war-barges manned by South Carolinians and Georgians.

It is obvious that October 27, 1775 is not the birthday of "the Navy and the Marines." If the resolutions of Congress are to guide, it would appear that October 5, 1775, is the natal date. If state navies are considered as a basis of decision, as they should be, an earlier date can properly be selected; and if the "risings afloat" (similar to "risings ashore" as at Lexington) are to decide, the Navy will have a still earlier origin.

This subject has more importance than that of merely writing articles to tell Americans about their Navy. We in the Western Hemisphere are finding ourselves historically. We are inquisitive to a degree never before reached about our past, and woe be they who wilfully or unwilfully mislead the proletariat and others. One gentleman stepped into a bog when he "wrote up" Rachel Jackson and has the whole sovereign state of Tennessee clawing at his back. Let us keep our birthdays on an even keel; let us line up our various "Fathers of the American Navy" and pick out the best looking; and above all let us refrain from letting said "Fathers" say things which we cannot prove they ever did say. Among the thousands of resolutions considered and passed by Continental Congress there may be some referring to the Navy that we have not set out here. If so, let the reader consider them if they affect the subject under discussion, and not think harshly of the writer, who is *bona fide* in his efforts to help the naval service, in which he serves.

Henry Ford's *Dearborn Independent* just recently has come out with the following announcement:

With all respect to Colonel Mitchell, he is not the Army and Navy of the United States. Yet his utterances are given columns, pages, reams of publicity, where official Army and Navy utterances are wholly suppressed. It is not fair. It is exceedingly bad public policy. A nation, trained to suspect its Army and Navy will just as quickly suspect Mitchell, were he our war lord.

In view of the widespread and complete suppression by the American press of the facts which responsible and representative Army and Navy officials have to give, *The Dearborn Independent* has decided to redress the balance as far as possible by letting Americans read what their defense representatives have to say *at first hand*.

This does not indicate a policy favoring Army and Navy contentions against Mitchell contentions in the present controversy. It indicates our belief that no controversy is fair or American that does not give the people the whole truth on both sides.

This is the first of a series of articles on the question of airplanes in the American defense scheme.

From the Naval and Military Record, December 18

BRITISH SUBMARINE M-1, WHICH DIVED WHILE ENGAGED IN EXERCISES OFF PLYMOUTH, AND WAS NOT SEEN AGAIN

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT COMMANDER H. W. UNDERWOOD, U. S. NAVY

DECEMBER 3, 1925, TO JANUARY 3, 1926

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GREAT BRITAIN

The Problem of the Submarine

The Engineer, 27 November, 1925.—It is as easy to understand as to sympathize with the motives which have impelled the Committee of Lloyd's, through its chairman, Mr. Percy Mackinnon, to make a public appeal for the abolition of all submarines. The loss of *M-1* is the fourth submarine disaster to occur since the war, each involving the total destruction of vessel and crew. One hundred and ninety-three officers and ratings, the very pick of the navy's manhood, have gone to their death in this tragic fashion, there is a not unnatural tendency on the part of the public to challenge the need of such a heavy toll of life in time of peace. The chairman of Lloyd's has denounced the submarine as "a deadly machine, which treacherously destroys those in charge of it, and, it is feared, inflicts slow torture as well as death." His plea for its abolition has been warmly taken up in influential quarters, and the government has already been invited to convoke a conference of the maritime powers to give effect to the suggestion. There is no doubt that the world at large would stand to gain much and lose nothing by the extinction of a naval weapon which, during its relatively brief career, has caused a disproportionate amount of suffering to humanity. Long before the Great War the submarine's victims were numbered by the hundred. During the war its persistent misuse by one of the belligerents covered it with such obloquy that its legitimate achievements have been obscured. Hence it remains a weapon of sinister associations, and we believe that its formal repudiation by the Powers would be hailed with an almost universal chorus of approval.

Despite unceasing efforts to extend the margin of safety by improvements in design and equipment, submarine navigation undoubtedly is still attended with special hazards from which the surface ship is immune. We are not unmindful of the Admiralty's contrary opinion, as set forth in a Fleet Order of November 21, 1924, that "the development of submarines has now reached such a stage that it is no longer practicable to adhere to the system of restricting service in them to volunteers." This order went on to announce that "although volunteers will be called for as hitherto and be given preference in selection, officers will be appointed and ratings drafted for service in submarines as requirements may demand." Clearly, therefore, the Admiralty does not consider that men doing duty in submarines incur risks any greater than those incurred in other branches of the naval service. As to this, however, we fear the public will not be so easily satisfied. Questions are being raised as to whether our underwater craft are furnished with safety appliances of tested value. They would, of course, have been useless in the case of *M-1*, in view of what we now know to have been her fate; but the moment is opportune for drawing attention to the possible utility of such devices. It has frequently been suggested that the provision of floats, which the crew of a submarine in difficulties could release, might assist materially in the prompt location of the vessel. Such floats, fitted with electric syrens, smoke-boxes or flares, would broadcast a warning over a wide area of sea, whether in daylight or in darkness. Telephone buoys are, we believe, invariably fitted to the submarines of certain other navies; it would be interesting to learn whether they have been adopted in our service. Since it is too much to hope that the navy has suffered its final submarine disaster, it would surely be prudent to take such precautions as are calculated to mitigate the danger. We can surmise what happens when a submarine is run down by a surface vessel, as in the case of the *H-24*, the *L-24*, and the *M-1*, to enumerate the three instances of this kind which have occurred since the war. But occasionally a boat vanishes mysteriously—*e.g.*, the *K-5* in January, 1921—without leaving a hint as to the cause. The growth in dimensions, so far from reducing the

the element of risk, seems to have magnified it. Rapid diving, a very essential form of training, is an operation more perilous to the large submarine than to her smaller consorts. In vessels of the *K* and *M* classes it probably necessitates the admission of water to the tanks at the rate of some 200 tons a minute, and if the slightest delay ensues in getting the compressed air blast to act, the boat may plunge to a depth beyond the limit of recovery. That is one reason why the huge submersible cruisers which have been projected abroad are viewed askance by naval men in this country. For the present, however, we are less concerned with the technical aspect of the submarine problem than with its wider significance as an international question. Great Britain's position was clearly defined at the Washington Conference, when Lord Balfour invited the associated powers to join with us in discarding the submarine. The arguments advanced in favor of that proposal did not include any reference to the dangers inherent in submarine navigation, probably because it was recognized that the development of a potent weapon was not likely to be arrested by considerations of personal safety. Those who urge the scrapping of the submarine would do well to rest their case on firmer ground. The British Government, as Mr. Baldwin intimated in Parliament last week, has not altered the views it expressed at Washington four years ago. It is still prepared to banish submarines from the navy and refrain from building any further vessels of that type, on condition that the other powers will pledge themselves to similar action. Submarine disarmament, to be effective, must necssarily be reciprocal and universal. It is a complete mistake to assume that the submarine is worthless for British naval purposes. It has qualities which render it as valuable to us as to other nations, provided it is employed in a strictly legitimate manner. We are not able to share the view, which appears to be widely held abroad, that this country alone has reason to fear the submarine. That our dependence upon seaborne supplies renders us peculiarly vulnerable to commerce-raiding tactics is true enough, but having successfully withstood a submarine *guerre de course* which lasted four years and was waged with a determined ruthlessness without parallel in history, we may reckon with some confidence on surviving any future attack of this kind. The real menace of the German U-boat campaign lay in the novelty of the means by which it was conducted, and our consequent lack of preparedness. But once the effect of surprise had worn off, and our defenses had been readjusted to cope with the new conditions, it was not long before we gained the upper hand. If there be any persons abroad who imagine a future submarine offensive against British merchant shipping would bring this country to its knees, we can assure them in all sincerity that they are deluding themselves. Moreover, the five powers in conference at Washington all accepted the Root resolution stigmatizing commerce destruction by submarines as barbarous and contrary to international law, and although this appendix to the Naval Limitation Treaty still awaits ratification, the fact that it was endorsed in principle by each of the powers concerned implies a moral obligation which cannot lightly be ignored.

Circumstances have conspired to make the submarine a provocative element in world politics. It has acquired an ominous significance from which every other type of warship is free, and its permanent removal could not fail to have a tranquilizing effect on international relations. That it possesses a distinct value as a weapon of naval warfare we freely admit. On the other hand, its powers have been greatly exaggerated. The elimination of the submarine would not modify in any appreciable degree the relative standing of the various navies. France—which we name without invidious intent—would not forfeit a fraction of her growing naval strength if she scrapped her entire fleet of submarines, provided that corresponding action were taken by the other powers. In fact, the simultaneous disappearance of all the submarines in the world would leave the current order

of naval precedence precisely as it was before. Whether such a measure lies within the sphere of practical achievement remains to be seen. Judging from the semiofficial statements which have been published, neither the United States, France, or Japan would be prepared to enter into negotiations for abolishing the submarine merely on the score of its liability to accident. Therefore, as we have suggested, the appeal for abolition should be made on the broader issue of international welfare and good will. On that ground a more sympathetic response might be forthcoming.

Abolition of Submarines

The Naval and Military Record, 2 December, 1925.—It is but natural that in the wave of national emotion which follows upon a submarine disaster the cry for abolishing this type of craft should be raised in an urgent note. The tragedy of *M-1* has befallen at a time when this demand seems particularly opportune. All the great naval powers are contemplating the prospect of an early agreement upon the reduction of armaments, and what better form could this reduction take than by abandoning a class of vessel whose very name has come to be associated with grief? This, we repeat, is the natural sentiment born of every submarine disaster, and becoming stronger with each successive submarine disaster, until it has now found more definite and imperative expression than ever before. International public opinion, we believe, is unanimous on the point, because the ever present risk and the periodical fulfilment of it are shared in common by all nations which use submarines.

But when the wave of emotion spends itself and it becomes easier to view the subject in its proper proportions, the counsels of the naval advisers again begin to carry a weight which is temporarily lost during the first flood of feeling. People begin to turn to statistics with a view to trying to determine the real degree of risk which attends the use of the submarine as a naval unit. A rough estimate of the number of boats maintained by the sea powers, of the total personnel employed in them, of the number of trips made during a given period of time in the course of normal training, divided by the number of mishaps during that same period, produces a quotient of infinitely small proportion. It is greater than the corresponding result shown in the case of any class of surface warships estimated by the same process. But is it great enough to outweigh all military considerations? This is the aspect to which we have now come in relation to the plea raised by Mr. Percy Mackinnon, the chairman of Lloyd's.

Marine Salvage Work

Engineering, 4 December, 1925.—In the salvage of sunken vessels every stage in the work of preparing for the final operation has to be formed with such care that no new difficulties are introduced. Foresight of an exceptional nature is therefore demanded from those in charge of the work, and the whole scheme of progression in the venture must be thought out beforehand, so that no unnecessary risk is taken at any time. The forces made use of in the work are considerable, and must be applied with care, while observation must be made continuously of their action. Weather and sea conditions have also to be contended with and, unless the worst is always prepared for, may be the cause of delay in the work and enormous increases in the cost. The salvage of vessels is therefore one of the technical callings requiring from its exponents the highest type of professional skill, while the appliances put into service must be absolutely certain in action, and so constructed that reliance may be placed on every part withstanding the stresses to which it is subjected and working with smoothness. In recent years a great advance has been made in the work of salvage, and Sir Frederick W. Young, in the course of a paper entitled "Salvage Work," which

he read at a meeting of the Institute of Marine Engineers at the Shipping and Engineering Exhibition at Olympia on Friday last, contended that this was largely due to the European War. Compared with prewar days, greater lifts are now attempted and many operations are undertaken and accomplished which formerly would have been regarded as offering no promise of success. In the course of the war all the previous lifting records were far exceeded by the Admiralty craft, which consists of six hopper barges converted into lifting vessels.

These barges are 165 feet long and 36 feet broad, and have a draught light of 5 feet. Each has a safe lifting power of 1,500 tons, with an immersion of eleven tons to an inch. In the conversion the entire super-structure of girders was cut away and the well coamings were cut down to one foot in height. The hopper doors were plated over, and the vessels were strutted from side to side by fourteen inch logs supported by log stanchions and all tied together. A deck was laid over the well with hatches for access, and a set of nine-inch lifting wires and other stores are carried in this space. Heavy pitch-pine logs were fitted on the deck edge and rounded off to take the wires. For the supply of steam to the winches a Cochran boiler was fitted on the forward end of each vessel. In lifting, these barges are used to haul in wire ropes which have been placed under the sunken vessel. Actually the most difficult part of the operation is getting the wire ropes in place, especially if the vessel is embedded in sand or mud to any appreciable depth. Compressed air, pumping, explosives, and other expedients have to be resorted to for the purpose. Successful work was rapidly done in the case of one vessel by the use of monitors taken from the decks of two fire-floats and lowered on slings to the top of the mud, the connection from the steam pump to the monitors being made with a six-inch flexible bronze tube. By this means trenches twelve feet long were tunnelled right under the bottom of the ship in the required places and thirty-two wires were put in place in three weeks, when the ship, weighing 5,200 tons, was lifted by the barges, assisted by compressed air. Should there be little rise and fall in the tide submersible pontoons are used. In the case of the uprighting of the *Gladiator* these were attached to nine-inch wire ropes passing under the vessel and made fast to the upper side of the ship. The pontoons were sunk in position to begin with and the water was afterwards expelled by compressed air to right the vessel.

The raising of the *Vindictive* proved a difficult task. When salvage operations were started on the Belgian coast she could have been floated and brought home and preserved as a relic of a great exploit, but before any decision was reached about the advisability of this, bad weather came on, and during a gale the ship broke her back. All the bulkheads had been shattered and the bottom practically blown to pieces by the charges used in sinking her. The removal of concrete and mud proved very difficult, and took a long time to accomplish. As there was little room for ships to pass, and it was probable that if the attempt was made to separate the two parts of the vessel for lifting she would fall into the channel, it was decided to tie the structure together by the use of very heavy girders. When raised by the lifting barges assisted by compressed air, the historic vessel was presented to the king of the Belgians.

In the salvage operations undertaken in the period of the European War compressed air was used to a much greater extent than ever before. By its use thousands of tons of mud and sand were discharged from sunken vessels by means of simple ejectors composed of ordinary flexible suction hose with a small air pipe inserted at the lower end. An example is afforded by the battleship *Brittania*, which was saved from becoming a total loss by the use of compressed air. When entering the Firth of Forth she was obliged to alter her course to avoid collision with a trawler, and ran on the rocks at high speed. Exposed to weather and liable to destruction by submarine attack, she was in a dangerous situation. The bottom was quickly pierced by

the rocks and the double bottom flooded. By the removal of stores, ammunition, and coal, the vessel was lightened and air connections were made to the lower double bottom, and in twenty-four hours sufficient water had been expelled to provide the requisite buoyancy to float her off the rocks before high water. She was then taken away for repairs and made ready for further service. She was eventually torpedoed near Gibraltar on Armistice Day or the day after.

Naval Engineers

Engineering, 27 November, 1925.—It is with some feeling of apprehension for the future that we regard the fleet order issued last Saturday by the Admiralty, which deprives the naval engineer of military rank. It appears that in future the officers of the navy are to be divided up into thirteen distinct categories instead of the pre-existent five, and in this new classification a distinction is made between executive and engineer officers. The former alone will be eligible to succeed to the command of a ship or to exercise military control. The present regulation by which lieutenants (E†) were allowed to revert to deck duties on promotion to the rank of commander is abolished. One step in this direction had already been taken in 1918, when engineer officers were deprived of the chance of attaining to the command of a battleship or of a fleet.

Probably Parliament will, in the near future, be given an explanation of the reasons which have led to this complete reversal of the Fisher-Selborne policy inaugurated ni 1902, as the result of a prolonged agitation for more favorable treatment of the engineering branch of the service. Under this scheme all cadets received the same preliminary training at the naval colleges, and those who later on elected to specialize in engineering were still regarded as having military rank, the position of a lieutenant (E) being regarded as in every way equivalent to those who selected the gunnery or torpedo branches. All stood accordingly on a similar footing.

Until this reform was made, engineer officers had a status in every respect inferior to those of the executive branch. They had merely relative rank, and this was in every case lower than the absolute rank of executive officers of the same age. Thus, an assistant engineer of twenty-one ranked with a sub-lieutenant of nineteen; a chief engineer of thirty-five with a lieutenant (of eight year's standing) of twenty-nine, and a fleet engineer at forty-three with a commander at thirty-six. The highest relative rank attainable was that of engineer-in-chief. He ranked as rear-admiral, but there was never at any time more than one engineer-in-chief, although there were many admirals.

There was no engineer officer on the Board of Admiralty and no engineer officer could sit on a court martial, even though highly technical questions were involved. Moreover, reports on machinery of a ship came to the Admiralty signed by the captain, not by the engineer, who had of necessity prepared them, and whose draft reports the captain was free to alter as he wished. Even in the Naval Intelligence Department there was no engineering representative, although room was found for paymasters and marine officers. The engineer officers were, moreover, in general paid less than other officers of equal age. In fact, in 1891 an assistant engineer of twenty got only 6*s*. a day, while a naval instructor of the same age received 12*s*.

As a consequence of such conditions, great difficulty was found in getting recruits for the engineering branch of the Navy. To make good the shortage, every conceivable expedient, save that of improving the pay and status of the engineer, was tried in turn by the Admiralty, but conditions steadily got worse. Competition for entry into Keyham fell off alarmingly. The Admiralty circularized the head masters of our public schools, urging them to send up boys for the entrance examination, but at the head master's conference held subsequently it was decided that this course could not

be recommended to parents under the then existing conditions. It was next attempted to establish a system of direct entry into the Navy from the technical colleges and the larger engineering works. This also failed. Only six candidates came forward in 1902, of which but three were able to pass the examination. As a further step the standard was lowered, but, in spite of liberal advertising, not a single candidate came forward for the January examination in 1902, and only two for that held in June.

Still the upholders of the traditions dating from the "stick and string" epoch were determined not to yield, and they hit upon the idea of giving sufficient engineering training to the executive officers to enable them to look after the electric, hydraulic, and pneumatic machinery on shopboard without any assistance from the engine room, hoping that the supply of competent engineers might thus be economized. The preparation of a scheme for giving an engineering training to gunnery and torpedo officers was entrusted to the captains of the *Vernon* and *Excellent*, with the cooperation of the chief inspector of machinery at Portsmouth. The two former prepared a very elaborate scheme, for which they suggested a month's training might suffice, but as their engineering colleague knew that to master such a program as that presented would require some years, he refused to endorse their recommendations. The final proposal made, prior to the Osborne scheme, was to abolish engineer officers entirely and operate the engine room with artificers only, under the nominal direction of executive engineers. Certain admirals insisted that a naval engineer need not be anything more than an engine driver. Nothing more, according to one of these authorities, was needed than a Lascar with an oil can.

The whole of these ingenious plans failed, and on December 16, 1902, Lord Selborne announced the decision to adopt the Osborne scheme (largely due to the late Mr. D. B. Morrison), in which, as already stated, all officers were to receive the same preliminary training, and to elect later for the engineering branch in the same way as for guns or torpedos.

The new fleet order marks the definite abandonment of this plan, and the reasons which have led to this decision will be awaited with some anxiety. It is, however, interesting to note that the old contention that the engineer's work is so simple that any one could do it is no longer maintained. In fact, the excuse put forward is that the requirements are so elaborate that the engineers must be whole time officers. This is flattering, but, unless there is some more substantial recognition of the prime importance of the engineer's work, thehre is a danger thaht the difficulty of securing recruits may recur. When the two branches were amalgamated in the American Navy it was anticipated that a due proportion would elect for engine-room duties. It turned out, however, that the "deck" had much greater attractions, and difficulties arose in consequence. The deprivation of military rank must of necessity lower the status of the engineer officer unless he is compensated by higher pay or in some equally attractive manner.

FRANCE

French Navy Notes

The Naval and Military Record, 9 December, 1925.—For the eighth time since 1920 the Minister of Marine is changing hands, and this time, strange to note, it is no newcomer in naval affairs who is installing himself at Rue Royale; this to the great relief of French naval men, who are heartily sick to see the great *Marine Francaise* used as a toy in the hands of passing politicians. Minister Leygues was in charge of the navy on the morrow of the war, and had left in naval circles the impression of a sincere friend of the navy and a warm supporter of efficiency on the water and gradual expansion. Moreover, he is well known for his Anglophile sentiments. He will attend the launching of the 10,000-ton and 35-knot *croiseur leger Duquesne*, and press forward ships in hand.

In the controversy that is raging around the question of dirigibles the partisans of gasbags, who are not a few in the service, are distinctly losing ground. Everything dirigibles are claimed to be capable of doing, either in peace or in war, modern avions can do, better, quicker, and with greater safety in every way, and, besides, avions offer a much wider field of utilization. M. Breguet, the eminent constructor of aerial machines of world repute, is of opinion that, at the present stage of aerial and motor progress, it would be a gross blunder and a waste of money, engineering talent, and of time to try to improve and develop the dirigible type, the future belonging without contest to the avion. Even the cross-Atlantic performance of the German dirigible ZR-3, about which so much fuss was made in Germany and in America, he demonstrated to have been much of a make-believe, and he considers that, far from attempting to discourage the construction of *Zeppelins* by our ex-enemies, France can afford to behold with a smile all Teutonic endeavors and bombast in that direction. Commercially a dirigible liner cannot pay; an 80,000-metre-cube dirigible would be obliged (as the ZR-3 did) to lengthen her route by 25 per cent and to cover 8,000 kilometres instead of 6,500 from Europe to New York, which would call for at least thirty tons of fuel on board, leaving little over three tons available for goods or passengers. Admitting weight could be saved through lighter construction and motors and the carrying power brought to seven tons for cross-Atlantic passage, M. Brequet demonstrated that the fifty-five ton *avion-géant* he designed could transport fifteen tons at a crossing speed nearly three times greater than that of the gasbag.

As to military utilization, the fragile, inflammable, essentially vulnerable, and relatively slow dirigible in no way compares with the robust and weatherworthy, even tempest-proof avion-géant, that would cost much less in construction and in upkeep, and would catch and destroy in no time the most powerful gasbag. "Il est bien evident que des appareils capables de franchir les oceans à la vitesse de 250 kilometres à l'heure, armes de torpilles et de canons, seront les maitres des mers et que leur emploi bouleversera la stratégie navale" (Breguet). The sensational performance of Aviator Boissoutrot in the 2,000 h.p. super-Goliath *Farman* tends to confirm M. Breguet's contention. That machine that has a span of thirty-five mêtres and has a weight when empty of seven tons, flew for over one hour at 3,500 mêtres over Paris suburbs with nearly eight tons of fuel and load on board. With a four-ton load (fuel and passengers not included) the same giant machine kept for two hours, 19 minutes, at a height of 5,000 mêtres (16,500 feet). It is, up to date, the most powerful bomber in existence, but designs still more ambitious are in the course of realization. At St. Nazaire a 2,000 h.p. Richard monoplane hydravion of about forty mêtres span is ready for trial. This *bateau-volant* has been specially designed for cross-Atlantic service; and great expectations are formed of her capabilities. The interests of colonial defense will strongly benefit by the advent of new *avions-amphibies* capable of transporting fifty fully-armed soldiers from France to Africa: which opens vast strategic possibilities.

It is obvious that the *"croiseur aéro-naval* is in sight. She will be able to safely alight on the water and refuel at appointed places. She will thus have an ocean radius of action and be able to strike where and when least expected. This revolution in warfare benefits France and strengthens her hold on her colonies, but it might eventually benefit to a still greater extent Germany, that has industrial resources and constructional capabilities superior to those of France. The Fatherland will have in hand the means of making up for the loss of her battle fleet: a giant flying boat in the rôle of pirate would be infinitely more to be feared than any *Emden* or *Möwe*. No ship, however fast, could escape from the deadly reach of such a commerce-destroyer. It is easy to imagine giant-planes of tomorrow being used as

mother ships to small avions de chasse or bombers, the functions of which would be to carry boarding parties alongside intended preys, and to play a part in aerial contests. Effective supremacy will belong to the nation first in possession of those long-range aerial weapons.

Paris submarine experts have learned with some relief, technically speaking, the real cause of the unfortunate loss of the fine submarine *M-1*, which, like the American *S-51* and of the Italian *Veniero*, came to grief through ramming. In their opinion the technical working of submarines has become so perfect, and so great is the margin of safety, that the holing of the hull through collision or ramming is practically the only sort of accident that well-constructed modern underwater craft have to fear. The French practice for submarines to dive within sectors well defined beforehand has much to commend it. Safety precautions have kept improving ever since the ramming of the *Vendemiaire* and the *Pluviose*, and this without interfering with efficient training. Shallow motor-vedettes and seaplanes offer means of warding off passing liners and tramp steamers.

Admiral Violette, the new commander-in-chief of the Toulon battle fleet, is promising to be a worthy successor to Admiral Dumesnil, who has assumed the duties of inspector of the Mediterranean forces and *points d'appui*. Admiral Violette is ever at sea, and keeping to his motto: "Compenser la faiblesse du nombre par la superiorité de l'entrainement et l'audace de la tactique." In this direction, however, he will find himself sorely handicapped by the incredible instability that prevails in the composition of his crews, that include too great a proportion of eighteen-months-term recruits, who are ever being transferred from shore training centers to ships and *vice versa*, and are leaving the service at the very moment they reach a satisfactory standard of efficiency. With a system of this sort, fighting efficiency is bound to have its limitations, however great the value of the command. A slight improvement in the situation, however, will result from the large increase just made in the number of petty and warrant officers (*officers-mariners*). Although the Toulon fleet is hard at work with battle and torpedo practice and is silently piling up creditable performances and records, M. Violette pins his faith in those new tricks and innovations susceptible of favoring the weaker side and of helping David against Goliath. Hence the importance given to night exercises, camouflage, and smoke-screen devices, and to aerial tactics. *Batailles d'escadres* or artillery duels on the high sea in the old style the French Navy is giving up altogether. From the fertile brains of French admirals new tactics are being involved, based on speed, invisibility, dash, and the combined use of shore, air, and sea factors. Under this novel method of warfare the fighting worth of the Toulon Squadron is measured, not only by the number and individual strength of its units, but also by the number and strength of those aerial and torpedo stations capable of swiftly dashing to the rescue at whatever point of the Mediterranean it might be engaged. Admiral Chauvin, in the North, is applying the same principles in the training of his small but seaworthy coastal squadron.

Frenchmen have no thought of minimizing the greatness of the victory Nelson won at Trafalgar or of depreciating the grand figure of the lion-hearted British hero who was admittedly "le plus grand marin de tous les temps." He is the Napoleon of the sea, and possessed the qualities of the complete leader—fearlessness, boldness with prudence, tactical genius, psychological judgment, and the gift of enthusiasm enabling him to win the hearts of his subordinates. Still, there are explanations of his unparalleled successes, viz., the French Navy, destroyed by the Revolution, was under Napoleon merely a shadow, a caricature of its former self; ability in the command and maneuvering power were gone, and could not be improvized.

JAPAN

Japanese Naval Retrenchment

The Naval and Military Record, 25 November, 1925.—Following upon a long departmental controversy, somewhat similar to our own experience of such contests between the Admiralty and the Treasury, the Japanese Government has decided to largely reduce its naval commitments. The three years' program of new construction for which £27,000,000 had been voted, is to be curtailed to such a degree that only £13,000,000 will be spent during the period. This, of course, means that the four 10,000-ton cruisers and the ten ocean-going destroyers will be very much retarded. Such a result may well exercise a repercussion upon the naval policy of other naval powers The step is taken simply as a concession to economic necessity. But for this financial stringency there is no reason to suppose that Japan would have modified her naval plans, more particularly in view of the grave uncertainty of the outlook with regard to China.

But there is another aspect to this voluntary naval retrenchment. It comes at an opportune juncture since there is little room to question that another international conference upon the limitation of armaments will be proposed in the near future. The probable attitude of Japan towards such a proposal has been regarded with some misgiving. What justification there may be for this we cannot pretend to say. Probably the idea may be traced to the supposition that the invitation to a fresh conference would come from Washington, and that Japan, feeling very resentful at the passing of the Aliens' Immigration Act by Congress, would be little disposed to acquiesce in any American initiative on the subject of a further reduction of naval armaments. But, as a result of the success which attended the Locarno meeting, the general world feeling now is that the next word rests with Geneva, and not with Washington. If there is really anything in the suggestion regarding Japanese susceptibilities this change of venue should serve to effectually remove such a possible obstacle.

Again, by voluntarily taking this step of retrenchment, Japan will naturally consider it to her advantage to help in bringing about an agreement under which the other great naval powers will cut down both their existing fleets and their future programs. An international ratio of naval strength having been agreed upon at Washington between the three biggest sea powers, any modification in due proportions will leave the situation virtually unchanged so far as they are concerned. It has long been clear that owing to the very inadequate scope of the Washington Pact, the 5-5-3 ratio is, in fact, not being adhered to, and this without any violation of the Washington Treaty. The position, indeed, is so indefinite that there is plenty of justification for the dissatisfied criticism which comes from the other side of the Atlantic. As to the desire of the British Government for a further step of naval limitation, this is sufficiently self-evident from the very sweeping reductions which the Admiralty are now carrying out.

In the United States no corresponding process of naval curtailment has yet been entered upon. This is quite intelligible. Britain and Japan are cutting down their naval expenditure as a matter of economic expedient. No such necessity exists in the case of America. She can perfectly well await the results of another international conference before taking any steps in the way of reduction. Of her attitude towards the whole question of restricting armaments, the reported utterances of President Coolidge can leave no doubt. Naturally, it would be more gratifying to American sentiment for the next conference to be held at Washington, but we do not imagine that she would demur to participating elsewhere on the grounds of *amour propre*. She cannot be uninfluenced by the anticipatory measures which are being taken in this country and Japan. The direct cause of the measures is really

immaterial to the effective result. A general process of marking time has now developed itself throughout the navies of the world, that of the United States being the only noteworthy exception at the moment.

AVIATION

Progress in Aeronautics as Related to Mechanical Engineering

Mechanical Engineering, December.—The development of outstanding interest in aeronautics in the United States during the past year has undoubtedly been the renaissance of public interest in the application of aircraft in transport. The inauguration and extension of air routes has been proceeding in Europe with more or less regularity under the persuasive influence of exteremely liberal government subsidies. As a result, a network of European airlines has been brought into existence. This network looks most imposing until it is pointed out that not a single line could exist were the heavy subsidies discontinued. In the United States many attempts were made to establish routes during the several years since the close of the war. Lack of government subsidies, lack of public support, insufficient capital and—only too frequently—neglect of certain basic principles of transportation combined to doom many to failure. An outstanding exception was the United States Air Mail Service, operated by the Post Office Department. This service, although carried on at a heavy loss, served a very useful purpose in many ways.

In the field of air transport, the most important development of the year has probably been the inauguration of night air-mail service between New York and Chicago. The activity of the Ford Motor Company also is worthy of note. Early in the year this company (which had been quietly interested in aeronautics for several years) began operation in an air-transport system between some of its plants. The initiation of the Ford lines was closely followed by announcement of the plans of National Air Transport, Inc. This company was organized by a number of the leading business men of the United States for the purpose of establishing air-transport routes on a large scale. The two announcements created a profound sensation among the public and resulted in a general acceptance of the idea that air transport had "arrived." Responding to the invitation of Air Mail officials, several prominent airplane constructors produced some new types of airplanes suitable for carriage of mail and similar matter. Following the development of these mail-carrying airplanes, the Post Office Department called for bids for the carriage of mails over several proposed routes and received a number of offers. Certain of these bids have been accepted, and operation of the routes is to begin in the immediate future. At the same time, gradual extension of European airlines has been continued. Many of the existing airlines have shown important increase in traffic but none has yet reached the stage of self-support independent of its subsidy. The outlook is, however, encouraging in this regard, and it seems probable that at least one or two routes will soon become free of dependence upon subsidies.

The most marked advance in the development of night-flying equipment has been in the production of less expensive appartus. Most of the equipment previously developed was very expensive to install—indeed, from the commercial viewpoint it was prohibitive. However, the present year saw the introduction of a full line of electrical equipment of high reliability and much of which is available at considerable lower cost than the older apparatus which it displaces. While the equipment available for night flying is now thoroughly practical, further work yet remains to be done. Among such problems might be listed the matter of further reduction in initial cost and increase in the range of the lights in fog. Some experimental fog-piercing lights have been built and now are being tried out. The

establishment of night service with a lighted airway from New York to Chicago, previously referred to, marks an important advance in night flying, as the territory flown over presents more than usual difficulty.

In this field one of the most interesting products was the Loening amphibian built for the United States Government and used in connection with the MacMillan arctic expedition. This design possesses many points of unusual interest, notably the arrangement of folding the wheels into the single float, and the inverted engine installation. The inverting of the engines, as in this Loening design, also is being tried out in some other designs, and possesses advantage in allowing greater vision and better propeller clearance. Continued improvement has been shown in airplane design but this improvement, during 1925, has been due mainly to refinement rather than to radical damages. The activity of the past few years in the construction of gliders seems to be gradually shifting to the construction of very small-powered airplanes. In the United States some work has been given to the two-and three-seat type. A vivid illustration of the seaworthiness of modern flying boats was given in the performance of the Navy *PN-9*, which remained afloat for several days after landing in the Pacific and was finally towed to land with no serious damage to the hull.

The development of insecticide dusting on a commercial scale resulted in the production by the Huff-Daland Company of a Liberty-engined "duster" airplane of 1,000 pounds capacity.

Activity in the airship field was marred by the destruction of the U. S. N. *Shenandoah*, with a loss of several lives, in a severe storm over Ohio. While there is no doubt that airship development will be seriously affected by this disaster, the work will certainly be continued. It seems very questionable if airships can be designed to withstand extreme conditions such as the *Shenandoah* encountered, but the accident will probably result in the provision of greater strength and more power in future designs. The increased power becomes desirable for the purpose of avoiding storm areas more readily. As indicating the continued faith in rigid airships, appropriations have been asked for the construction of a still larger type. In the meantime, work on nonrigid and semirigid airships is being continued. One of the interesting developments in connection with airship activity was the construction of a very novel type of mooring mast by the Ford Motor Company at Dearborn, Michigan.

A considerable amount of research and experimental construction is still being carried out on engines. Marked advances have been made during the past few years, particularly in the further reduction of weight ratio (to horsepower) and in further increase in reliability. Through the important advances made in the construction of air-cooled engines there is a very distinct tendency toward this type for all sizes up to, possibly, 500 or 600 h. p. Both here and in Europe air-cooled engines developing up to 400 h. p. have been produced, and the larger units are now undergoing what may be regarded as a period of probation. It is by no means improbable that the power of the air-cooled engine may be pushed well above the 600-h. p. mark in the near future. Important advances have been made in extending the life of all types of engines, a feature which will become of major importance with the development of air transport.

To meet the requirements resulting from the constantly increasing speeds of racing airplanes, air-speed indicators have been developed which read up to 350 miles per hour. The development of gasoline gauges of the hydrostatic type, which has been under way for several years, has now reached the stage where this type of instrument is considered thoroughly practicable. On account of the increasing number of instruments required in airplanes and to facilitate their arrangement and use, instruments of the vertical type have been developed and are coming into general use. It is really surprising how compact and how practical the instrument-board arrangement can

be made with this type. The ground inductor compass, which has also been under development for a few years, has now reached the stage of practical utility.

The work in this field consisted mainly of refinement and improvement of equipment previously developed. Aerial photography has, for several years, been one of the best established branches of aeronautical activity and it is steadily growing. Technical progress is being made chiefly along the lines of increased accuracy, greater range of camera, and greater independence of light conditions. Some advance has been made in this direction through increase in sensitivity of the film used. The steroscopic method of plotting elevation contours on aerial photographs has advanced to the stage where a high degree of accuracy is possible.

Wind-tunnel and full-scale investigation of wing sections, bodies, and parts of aircraft has been steadily continued. This work reached the stage, a few years ago, where progress is made only in very small steps at a time. Consequently, while progress has been made in 1925, it is difficult to list all of the important points. However, there might be mentioned the work accomplished in the development of high-lift wings through auxiliary flaps, and so forth, the experiments with fins placed at the tips to decrease end loss, and the experiments with devices to automatically prevent "stalling" of airplanes at low speeds.

Outstanding Problems in Aeronautics, 1925

Airships

1. Further study of the stresses in rigid airships encountering unusual weather conditions.
2. Study of landing facilities and facilities for loading and unloading of airships used for transport.

Aerodynamics

1. Investigation of the relative resistance of air-cooled and water-cooled engine installations.
2. Study of methods of eliminating or quickly stopping the spinning of airplanes.
3. Study of large-capacity bodies for transport airplanes and of their effect upon tail controls.
4. Wing combinations permitting further increase in speed range.
5. Further investigation of maneuverability and controllability, with particular reference to lateral stability and control at stalling angles and beyond.
6. Further study of interference of propeller slipstream, body, and wings.

Air Transport

The major problems confronting us in commercial air transport are economic rather than technical. Problems concerning the "selling" of air transport to the public and the development of popular "demand" cause the technical problems to sink into relative insignificance. At the same time, these technical problems actually do exist and the more important or more pressing ones might be considered to be:

1. Operation of aircraft through fog. (This problem has been partly, but not wholly, solved through the development of the earth indicator compass.)
2. Extension of engine life or (what is the equivalent) the reduction of the initial cost of engines.
3. Simplification of maintenance of airplanes and engines, including rapid demountability in interchangeability of parts.
4. Development of methods of quickly loading and unloading large airships against the time when these will be used in transport.

Naval and Military

Naval and military problems may be viewed at present as consisting mainly of continuing the development and refinement of airplanes and their equipment and it is difficult to list any few items which can be classed as *outstanding* problems. It seems to be generally agreed that there is room for further standardization of small parts and equipment used in military and naval aircraft.

Research

1. Investigation of duralumin corrosion and "decay," and the development of suitable protective means, probably represent the most outstanding problem under the head of research.
2. The development of methods of protecting the interior of metal tubes against corrision represents a reseach and manufacturing problem of great importance.
3. Further investigation of the fatigue of aircraft materials (particularly steel and duralumin) and their fastening means when subjected to vibration.

General

1. Investigation of methods of decreasing fire hazard. Some work of importance has already been accomplished along this line but the problem is not yet fully disposed of.
2. Development of "crash-proof" compartments for passengers, pilots, and cargo in airplanes.

ENGINEERING

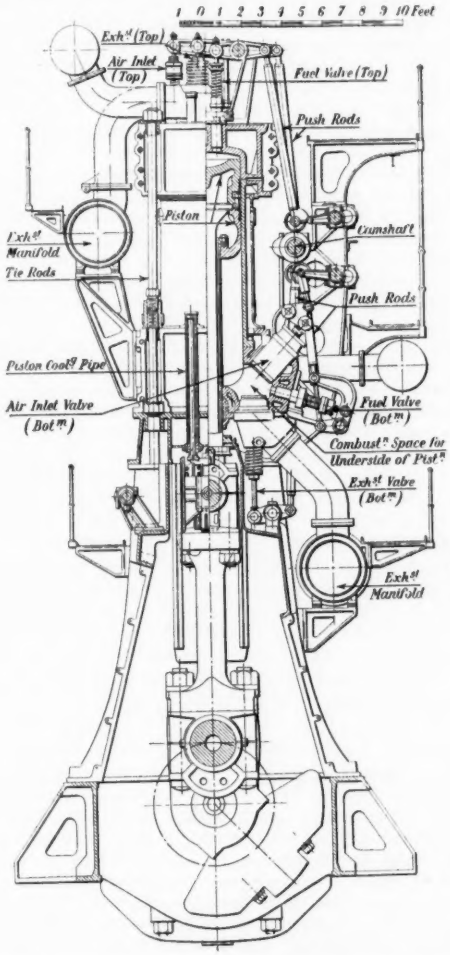
First Motor Passenger and Mail Liner for Transatlantic Service

The Marine Engineer and Motorship Builder, December, 1925.—It is almost a year ago since we published a description of the *Aorangi,* which was the first large motor passenger and mail liner. This vessel, as is well known, was intended for transpacific service, but the vessel which we now describe is intended for the arduous and exacting transatlantic service. The *Gripsholm,* which incidentally takes her name from the historic Gripsholm Castle, in Sweden, once a home of Swedish kings, has been designed under the personal supervision of Director Filip Lindahl, of the Brostroms Lines Agency, and of Sir John Biles and Company, the owners' naval architects, for service between Gothenburg and New York, which distance, it is anticipated, she will be able to cover in about eight days. The vessel has the following dimensions and particulars:

Length, o.a.	574 ft. 6 in.
Length, b.p.	550 ft.
Breadth, extreme	74 ft. 3 in.
Breadth, moulded	74 ft.
Depth, moulded to boat deck	76 ft. 6 in.
Depth, moulded to *D* deck	42 ft. 6 in.
Load draught	29 ft.
Load displacement	23,600 tons
Deadweight	10,000 tons
Gross tonnage (about)	17,300 tons
Speed	17 knots
Oil fuel capacity	2,450 tons

There are in all four continuous decks, and one part deck extending on either side of the machinery space. There are ten main transverse watertight bulkheads which ensure a two-compartment floodability standard for the ship. There is a double bottom throughout in which provision is made for oil fuel and for water ballast. The construction of the fore end of the

ship has been especially strengthened for possible shocks against ice. There are three main cargo holds and two cargo 'tween decks, and the total cargo capacity of the vessel is approximately 284,000 cubic feet and 13,200 cubic feet of insulated cargo space, while in addition to this, there is provision for 11,000 cubic feet of refrigerated space for the ship's stores and 16,000



SECTION THROUGH THE "GRIPSHOLM'S" MAIN ENGINES.

cubic feet of ordinary store room space. Mail and baggage rooms of about 10,000 cubic feet also are provided. The vessel has been constructed according to the rules of Lloyd's Register under special survey, and has been assigned 100 A.1 class. She complies with the requirements of the British Board of Trade for passenger and emigrant ships, and includes the latest regulations as to subdivision by water-tight bulkheads, and so forth.

The vessel also conforms with the requirements of the Swedish and American laws relating to passenger vessels, and likewise with the Suez Canal and Panama tonnage regulations. The *Gripsholm* has a straight stem, slightly raking forward and a counter-stern. She has two funnels, one of which takes the exhaust from the main engines, and the other the exhaust gases from the small auxiliary boilers. Over the upper deck is a continuous shelter deck, with a long bridge deck over the shelter deck, extending from No. 2 hatch to No. 6 hatch, a promenade deck over the bridge deck extending from No. 3 hatch to No. 6 hatch, and a boat deck over the promenade deck from No. 3 hatch to No. 4 hatch. There are eight decks in all, which are designated as follows: boat deck, promenade or *A* deck, bridge or *B* deck, shelter or *C* deck, upper or *D* deck, main or *E* deck, lower or *F* deck, and orlop or *G* deck.

The fore peak is, of course, a water-ballast compartment, while the next three compartments are cargo holds. A compartment containing two auxiliary boilers is situated immediately abaft the swimming bath, while at the sides of the swimming bath and boiler compartments are situated oil-fuel bunkers. The midship portion of the hold is occupied by two machinery compartments in the forward of which are installed the Diesel-driven maneuvering air compressors and electric generating sets. These occupy the central portion of the compartment, the sides being devoted to air coolers and other auxiliary machinery. The after compartment contains the main Diesel motors, the sides of this being used for oil-fuel settling tanks and engineers' workshops. Abaft the machinery compartments, the space in the hold between the shaft tunnels is utilized to provide No. 4 and No. 5 cargo holds. Outside the shaft tunnels are situated the fresh-water tanks, three on either side, extending the full length of No. 4 hold. The space outside the shaft tunnels abreast No. 5 hold is available for cargo, while the space abaft No. 5 cargo hold under *G* deck is utilized as a common shaft tunnel.

Main Propelling Machinery

The main propelling machinery consists of two sets of six-cylinder, four-stroke cycle, double-acting Diesel engines of Burmeister and Wain type. They are rated for 16,300 collective i.h.p. at 125 r.p.m. The auxiliary machinery of the ship is entirely electrically driven, there being for this purpose three Diesel-driven generators. The whole of the machinery and pipe work has been installed in the ship by the marine engine department of Sir W. G. Armstrong, Whitworth and Company, Limited.

Auxiliary Machinery

The propelling engines do not drive their own compressors, and therefore three separate Diesel-driven three-stage compressors, from which the necessary compressed air is taken, are installed in the auxiliary engine room. Each of these compressors is sufficient for supplying the compressed air for one main engine, and consequently only two will have to be in operation when the vessel is under way, whereas the third will serve as a standby. The compressors also act as maneuvering compressors supplying the necessary maneuvering air. Each compressor is coupled to a 700 b.h.p. (900 i.h.p.) four-cylinder Burmeister and Wain Standard Diesel engine running at 170 r.p.m., and one unit is illustrated on page 435.

In addition to the three compressor engines referred to there are three 500 b.h.p. three-cylinder Burmeister and Wain Diesel engines of their standard single-acting type running at 200 r.p.m. and direct coupled to 220-volt dynamos having a capacity of 330 kw. Of these, one or two will be needed at sea according to circumstances. Consequently a total of 990 kw. will be available for supplying the current for operating the auxiliary machinery for lighting purposes, fans, wireless, and so forth. The Diesel generators, as well as the compressor engines and the propelling motors, are fully balanced

so as to eliminate vibrations from the hull. The total power of the auxiliary engines installed in the separate engine room will be 3,600 b.h.p. and the total horsepower of both main and auxiliary machinery will amount to 17,100 b.h.p.

The pumps dealing with the main engines are electrically driven and located at the outboard sides of the after engine room. There are two complete sets of pumps for sea water and forced lubricating oil circulation respectively for each main engine, one set acting as standby. The cooling water pumps are of the centrifugal type, the drive being through electric motors running at 1,000 r.p.m. The jackets and cylinder cover are fresh water cooled, and for this purpose there is one cooler of the condenser type with a centrifugal pump fitted on the top driven by an electric motor for each main engine. A compensating tank for the fresh water is arranged in the engine hatch for each main engine. The lubricating oil pumps are of the B. and W. special design rotary type, driven by electric motors running at 1,000 r.p.m. There are two lubricating drain tanks below the engines, in the double bottom. The pumps deliver the oil through a double strainer and an oil cooler to the engines. A de Laval oil separator is fitted in the lubricating oil circuit of each engine. On either side of the engines at the forward bulkhead are the two settling tanks and amidships two oil fuel supply pumps with an output of 30 tons per hour driven by motors running at 800 r.p.m. The pumps draw from the settling tanks and deliver to a service tank arranged in the casing from where the oil passes a double filter on its way to the engines. The Diesel auxiliaries are provided with forced lubricating oil pumps worked from the engines, and two pumps of the centrifugal type are fitted in the forward engine room for the circulation of sea water, one acting as standby. Two settling tanks are arranged in the engine hatch, each holding sufficient oil for twelve hours, from which the fuel is distributed to double filters, one for each of the Diesel auxiliaries. To deal with the fuel there is a supply pump of the same pattern as for the main engines, two tank and transfer pumps of the rotary type with an output of 150 tons per hour. Four starting air receivers are located above the pumps, two on either snde of the ship. On the starboard side of the forward engine room is an electric-driven auxiliary air compressor, and in addition a smaller electrically driven emergency compressor.

Silencers

The silencers are arranged in houses on the boat deck. There are two for each main engine dimensioned to assure an almost perfect deadening of the sound from the exhaust and one for each three of the Diesel auxiliariis, the latter being provided with spark catches. It will be seen that the machinery is arranged in two separate engine rooms. The main engines with all necessary auxiliaries are located in the after or main engine room, and the supervision of this part of the machinery is left in the hands of the engineering staff destined for that room, while the blast and starting air for the working of the main engines as well as the electric current necessary for driving the pumping machinery is delivered from the forward engine room, so that the arrangement, in more than one way, resembles that of steam-driven machinery, with the propelling plant and its auxiliaries contained in the after engine space, whereas the driving power, namely the steam, is supplied from the forward space, viz., the boiler room. The duty of the staff in the forward engine room will be to assure a proper supply of blast and starting air as well as electric current. The length of the after engine room is forty-eight feet, and that of the forward, sixty-two feet.

Auxiliary Machinery for Ship Duties

Two Weir's 250-ton motor-driven ballast pumps, and two Weir's 150-ton motor-driven bilge pumps, are fitted for dealing with the bilge and ballast arrangements of the ship, while for the sanitary and general service ar-

rangement, four Drysdale motor-driven "Centrex" pumps, each having a capacity of 200 tons per hour, are provided. The fresh water requirements for a vessel of this class are considerable, and to meet the necessary demand three Drysdale motor-driven "Centrex" pumps are fitted, each having a capacity of seventy-five tons per hour.

There are two cylindrical multitubular boilers, made by Sir W. G. Armstrong, Whitworth and Company, each having 1,320 square feet of heating surface, fitted for burning oil fuel under the closed stokehold system. The necessary air for combustion is supplied by a motor-driven fan in the forward engine room. The oil-burning apparatus, of "Clyde" type, is arranged in duplicate, self-contained units. A condenser of 500 square feet, complete with independent air and circulating pumps, is provided for the steam drainage system from thermotanks, and so forth. Two Weir independent steam-driven feed pumps and a thirty-ton evaporator complete the boiler-room auxiliaries.

The Year 1925 in Marine Engineering

The Marine Engineer and Motor Shipbuilder, December, 1925.—A retrospective survey of the year which is now passing shows, as far as marine engineering is concerned, that although the economic state of the industry remains very precarious, scientific development and improvement has not been characterized by its absence. The motorship has very naturally taken up a considerable amount of attention, and development in this direction has been gradual but effective. A glance through our issues for the past twelve months would appear to indicate that the general tendency is toward standardization. Shipowners are beginning to tire somewhat of multifarious types and makes of engine, and of different interpretations of working cycles, and, as Lord Inverforth reminded the Institute of Marine Engineers in his recent presidential address, the desire is for a standardized engine which will enable fleet operators to interchange both working parts and also personnel. The desire, too, among cargo vessel owners seems to be for a straight Diesel drive rather than for any indirect transmission between prime mover and propeller. Indirect transmission has many advantages, but up to the present time two countries only seem to have championed its cause to any great extent, and these are Germany and America. Th former is carrying out exhaustive practical experiments with vessels having a single screw, driven by two high-speed prime movers, to which it is coupled by means of the Vulcan hydro-mechanical clutch. One such ship, the *Duisburg,* of 9,500 tons d.w., was described in our November issue. America, on the other hand, favors electric transmission both with current generated by steam turbo-generators and by Diesel engines. All types of ships have been fitted with this type of propulsion, from side-wheel ferry boats to large battleships. In Great Britain, and in the Scandinavian countries interested in the motorship, a slow-running single-acting engine, and in certain cases a double-acting type of engine, is proving popular. It must not be imagined, too, that steam has remained quiescent as regards development during the past twelve months. Many suggestions have been put forward for the production of a more economical steam-producing unit and installation for marine use, and superheated steam in conjunction with much higher boiler pressures is being suggested as something which will prove a serious rival to the marine internal-combustion engine from the point of view of efficiency. So that it will be seen that the year has been by no means barren technically even if somewhat arid commercially.

A New Cast Iron for Engine Cylinders

Power, 22 December, 1925.—A metal attracting much attention abroad is Perlit, a cast iron invented and worked in the foundries of Heinrich Lanz of Mannheim. According to *The Engineer,* London, by subjecting the metal

to careful metallurgical control as to its composition and by preheating the mold and core so that the rate of cooling of the casting is correlated with the thickness and the mass of the casting, it has been found possible to produce a pearlitic structure throughout all sections. The casting is tough and malleable and shows a marked difference in fracture as compared with that of ordinary cast iron. The gray iron so produced is remarkably low in its silver content and is largely immune from growth when exposed to high temperatures, which gives Perlit iron a particular importance for oil-engine work. A considerable amount of development work in connection with the production of standard castings of Perlit iron has been carried out in England and Germany.

The consistent qualities of Perlit iron are such as to render it to all intents and purposes a new metal. It is claimed that, for the first time in iron founding, a cast metal can be produced possessing properties that permit of the strength and weight of any casting being predetermined with an accuracy that up to now has been associated with mild-steel constructional work alone and lacking objectionable feature of growth encountered in cast irons under high-temperature conditions.

ORDNANCE

The Arrival of the Boat-tail Bullet

WHY THE BOAT-TAIL BULLET?

The Scientific American, December, 1925.—You can tow a tapered log easier and faster butt end first than point first. Unreasonable? Try it.

The speedy clipper ships by which the Yankee gained the commercial ascendency in the tea traffic a century or so ago had a longer taper aft than forward.

The rifle bullet seems to be governed by roughly similar principles. Take the bullet used at present by the United States Army, change its square rear end or stern to a taper, and you get remarkably improved results from it.

How the Army has been experimenting with all kinds of tapered or boat-tail bullets, and why these bullets have proved far superior to the kind now used, is told by Captain Crossman in his usual, easy, conversational style, with a bit of whimsy thrown in.

Government tests show that the new shape of bullet practically doubles the effective range of a rifle or machine gun, *The Scientific American,* December, 1925.—Last spring a flock of boat-tailed bullets, made and loaded into service ammunition by the Government Frankford Arsenal, shot a flock of holes in the one remaining objection to this type of missile—its comparative inaccuracy.

With ten-shot groups of hits at 328 yards, which averaged so uniform that they fell within a small rectangle, 1.88 inches from top to bottom, and 2.33 inches from side to side, the Frankford Arsenal proved that the ideal missile with its taper-tail, could also be made into the most accurate of bullets. Not satisfied with this extraordinary showing at 328 yards, the government gentlemen, in competition with the great commercial ammunition companies, proceeded also to win the ammunition test at 1,000 yards with the same bullet, the groups at this range averaging to fall within rectangles measuring 11.54 inches by 11.43 inches.

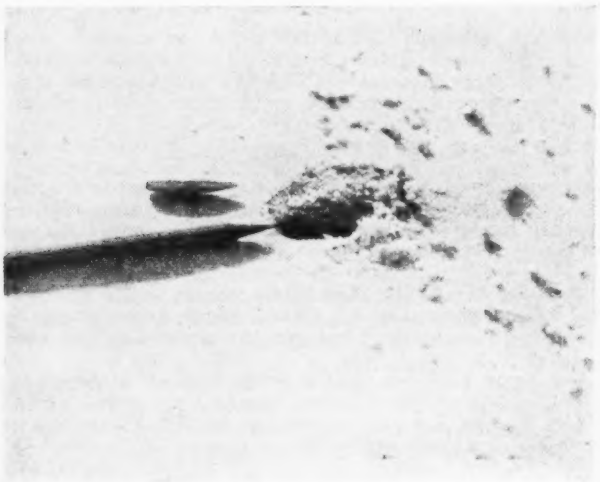
For several years one of the commercial companies had won this test with hand-selected, flat-base bullets 180 grains in weight, and with a velocity between 2,600 and 2,700 feet a second.

The boat-tail bullet, admittedly superior in its lessened time of flight and lessened sensitiveness to wind, had not been able to group its hits quite so closely as its old flat-base rival.

Thus, this machine-rest test of 1925 sets aside the one remaining objection to the boat-tail bullet. When a boat-tail bullet of wonderful ranging qualities can be made to give the same averages just quoted, for twenty-six strings of ten shots each at 328 yards, and for twenty-four strings at 1,000 yards, then it is apparent that the taper-tail missile is with us to stay.

For three years the boat tail bullet, of about 170 grains, has been loaded in the ammunition designed for our national rifle matches, about two million cartridges per year.

Because of the enormous stock of war ammunition remaining—nearly two billion rounds at the signing of the Armistice—the Army has not been able to load any additional ammunition save that intended for these great rifle matches. Wherefore, the official service cartridge of the Army is still the 150-grain, flat-base bullet combination, the standard since 1906. Unofficially, this light, flat-base bullet with its poor ranging qualities for machine-gun work, is deader than King Tut's chances for the presidency.



THE BOAT-TAIL BULLET STRIKES THE SAND AT THREE MILES AND IS DUG OUT

The national match boat-tail ammunition, while high in accuracy and of splendid wind-bucking qualities for long-range target shooting, had never been able, in the special match form, to beat the products of the commercial loading companies in the open machine-rest tests, and it had produced doubt in the rifleman's mind whether this form of bullet ever could defeat the old flat-base in a straight accuracy test.

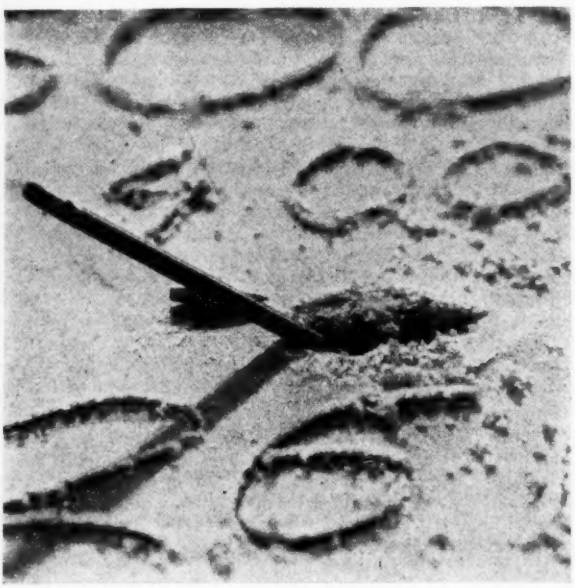
A little contemplation will show the difficulty of making boat-tail missiles shoot as accurately as the older type. The portion holding back the powder gas in the bore of the gun is not the extreme base of the bullet as it leaves the muzzle, but a portion about one-fourth of an inch farther forward, where the major diameter of the bullet is located.

When this leaves the muzzle, with the "tail" still on its way out, the gas, under the muzzle pressure of around 9,000 pounds per square inch, proceeds to rush out past the tail. If the bullet is not traveling precisely parallel to the line of bore, due to eccentric seating in the chamber, or if the tail is not exactly concentric with the rest of the bullet, the gas proceeds to

give it a violent twist one way or the other. This is not conducive to high accuracy.

With the flat, or square-base bullet, all that is necessary for perfect and uniform muzzle delivery is to make sure that it is seated correctly in the rifle barrel, and that the base of the bullet is perfect and at right angles to the long axis of said bullet. This is easier than making a quarter inch of tail with the same accuracy of form and place. Evidently the Frankford gentlemen have solved the latter and harder problem.

Since the war, the slight taper on the tail of the rifle bullet has proved to be the greatest development in small-arms missiles since the discovery by the Germans and Sir Charles Ross of the efficacy of the sharp point, about 1905. For every long range, machine-gun work the boat-tail feature is far more important, even, than the sharp point.



SURE-KILLING ANGLE AT 4,000 METERS

At two and one-half miles the trajectory is still comparatively flat, as shown by the angle of the pencil

The virtues of the boat-tail bullet were impressed upon the Allies in 1918 by the kindly disposed Germans, who illustrated this ballistic improvement by flocks of boat-tail machine-gun bullets of 195 grains weight, put over at very long range in harassing fire on roads, dumps, and other spots within reach of such missiles. These bullets were so far ahead of the German service bullet of 154 grains that the Allies were much annoyed at this Teutonic scientific advance.

But even at that time the boat-tail bullet was not new. Its sweetness had merely been wasted on the desert air.

The French solid bronze bullet had been wearing a slight taper to its tail for years prior to the war. This bullet, however, was so high in sectional density—its relation of weight to diameter, 198 grains, and .32 caliber

—that its long ranging qualities and its heavy wallop at great distance were due more to this density than to its tail.

The Swiss had designed a perfect boat-tail bullet six or seven years before the outbreak of war, a missile that stood unrivalled until the appearance of the recent United States nine-degree taper boat-tail. Our ordnance people knew about it, and had tested it, but unfortunately the ordnance experts were barking up two wrong trees. The first one was the dictum of solemn military conservatives that 1,000 yards marked the useful range of the rifle bullet, even in the machine gun; and that they didn't give two hoots what the bullet did at a greater range.

The second one was the erroneous conclusion that they could calculate from short-range figures, the entire flight of the bullet. This error, never checked by long-range firing, resulted in the solumn dictum in the textbooks of our rifle that our service bullet had a range of about 5,000 yards. As a matter of fact this is roughly one mile greater than the actual extreme range of our light service bullet, as firing in France and in this country during the war, speedily proved.

The fact that the ordnance experts of this and other countries took no interest in long range bullet performance was back of the unfortunate errors in our range tables, and in the failure to discover the wonderful properties of a taper on the tail of a small-arms bullet.

As a civilian enthusiast, I was one of those who did not find out that the Swiss boat-tail was superior to the regular type; but of course I lacked the opportunity for the long-range firing which alone could demonstrate the qualities of taper-tail bullets. Before out entrance into the war, Major L. B. Moody, Ordnance Department, then in tank and car work at Rock Island Arsenal, sent me a quantity of the Swiss boat-tail bullets and suggested that I load them up and see if they showed anything unusual. The Swiss bullet is practically the diameter of the American, and fortunately fits our service rifle.

Our firing at 1,000 yards showed that the Swiss bullet required about three minutes of arc, less elevation than the same bullet in flat-base form, and did not shoot so accuratley, all of which checked with the conclusion of other experimenters that there was nothing to the boat-tail but a glittering hypothesis.

I do not know whether the Swiss themselves ever knew just what their boat-tail bullet could do. If they did, they never published it to the world.

It required the practical demonstration by the Germans of just what a boat-tail bullet would do. This, and the obvious error in our tables for the service cartridge, led to the establishment by our government of the Small-arms Ballistic Station, located first at a reservoir in Massachusetts and later at Miami and Daytona, Florida.

The *piece de resistance* of this experimental boat-tail bullet work was a duplicate of the Swiss bullet, but termed the U. S. Model 1919. This bullet weighed 175 grains, and had a slightly longer point than the American service bullet and a taper tail of six degrees. This bullet consists of two tapers, the bow taper and the stern, joining at the major diameter of the bullet about .28 inch from the base. There is no "parallel" or cylindrical portion as with flat base bullets of the same weight.

We also did extensive vertical firing at Miami and Daytona, shooting a machine gun straigt up into the air to determine the time of flight for the round trip up and down, and to determine the position of the bullet when returning. The boat-tail bullets developed a queer tendency to separate and return in two distinct flocks, one of them requiring slightly more than one minute, the other flock returning in 50 per cent more time. Our suspician that some of the bullets sat down on a cloud to rest was cleared away by the firing on the Daytona sand later on, and the discovery that some of the boat-tails were falling sideways, hence were offering much more air resistance and requiring much longer to make the trip from the heights to

the ground. Evidently the boat-tail bullet flies in a critical state of balance and requires much "spin" in order to keep itself spinning "point-on." Firing for penetration corroborated this, the bullet turning sideways at the least provocation and diving at sharp angles out of the penetration racks. This tendency would greatly increase its wounding and killing qualities in war.

The feature of the boat-tail bullet is the fact that its ballistic superiority does not show to any marked extent until its velocity has fallen to 50 per cent or so of the velocity at which modern bullets start from military rifles. Over the first 1,000 yards of range it shows no marked flattening of its flight.

Beyond 1,000 yards, however, where the speed of the ordinary military bullet has fallen to an extent where the effect of the sharp point is comparatively small, the boat-tail really commences to get interested. Roughly speaking, the present model of 1924 U. S. nine-degree, boat-tail bullet of 172 grains weight, leaving the rifle at the same velocity as that of the 150-grain service bullet, practically *doubles* the effective range of machine gun or rifle.

At 3,000 meters the present square-tail, 150-grain service bullet is through. It is falling at such an abrupt angle, and traveling so slowly that often no trace can be found of a long machine-gun burst of fifty shots or more, because some vagrant zephyr has drifted the bullets clear off their original line. Generally speaking, about 2,700 yards marks the practical range of the present war reserve ammunition, in machine guns.

The virtue of this remarkable bullet is not only in extending the effective range, but in greatly increasing the chances of a hit because of its flatter trajectory, and of inflicting fatal wounds because of its enormous increase in remaining energy and penetrative ability. Indeed, comparison between the two types of missiles is really pathetic.

Guns and Tons

The Naval and Military Record, 2 December, 1925.—It is suggested that, assuming the capital ship to be discarded by general consent at the next international conference on the limitation of naval armaments—as seems quite possible—a tonnage restriction shall remain in force similar to the Washington regulation with regard to cruisers, but that no limit shall be set to the armament which may be mounted. The idea at the back of this is that the naval designers of the various countries should have more scope for their ideas than is possible under the present method laid down by the Washington Agreement. The business of naval designers is to give the best material expression to tactical principles, and if the capital ship is abolished—together wth the tactical principles for which she stands—it would seem as though the big gun is likely to go with her. The dominant idea in the design of every type of warship is to produce a vessel capable of beating the enemy. This is the simple explanation of the development of the gun and of the armor to resist it. Increase of range is incidental and not intentional; contending warships will naturally open fire as soon as they can hit one another, but there is no advantage, and considerable disadvantage, in fighting at ten miles instead of at two miles.

To limit displacement but leave freedom as to armament would be to create a new incentive to rivalry. So long as the 8-inch gun remains the limit all the powers which build 10,000-ton cruisers will adopt it, and the only competition will lie in the direction of trying to impose as many such weapons upon one hull as the art of compromise can devise. But to waive all restriction is to return to the "last word" principle. One power will produce a type carrying six 10-inch guns in two triple turrets. Another will respond with a type carrying four 12-inch guns. And so we shall be back to the old business of the naval nations trying to outclass one another, which is precisely what an agreement as to the limitation of armaments is designed to prevent.

No Clarity of Purpose

The Naval and Military Record, 2 December, 1925.—The big-gun school have always been a little hazy in their tactical doctrine. In a general way they claim that the preponderant weapon should beat the enemy. But there are qualifying conditions to this precept. The rational premise to the creation of any new type of weapon is to foresee how you are going to use it. In homely terms, when you have produced a weapon which can do all that can be done, what is the purpose of producing one capable of doing more than can be done? The Germans produced a gun which was able to bombard Paris from a range of about seventy miles. True it was a freak weapon, with a very short life but it demonstrated the possibilities of artillery range with modern ballistics. To suggest the practicability of an action between warships seventy miles apart is to come right down to the *reductio ad absurdum*. Unless the target were kind enough to await the arrival of the projectile it would be impossible to make any sort of marksmanship with the aid of aerial observation. Twenty miles probably represents the limit of horizon visibility in clear weather from the loftiest fire-observation platform. This is within the effective range of a big fifty-caliber naval gun—such a weapon as was used to bombard Dunkirk from behind the German lines.

Range, as we have said, is incidental to smashing power: the weight and velocity necessary to the one results in the other. In the race between the gun and armor the latter has been effectually beaten. Yet we have continued to develop the gun. It is permissible to ask what advantage our heavier weight of metal (irrespective of numerical superiority) proved at Jutland. We are told that our projectiles and fuses were very inferior to those of the Germans, which is probably true. We are told that their ships were much better protected than ours, which also is true. The 15-inch guns of the Fifth Battle Squadron were in action for the first time (omitting the spectacular exploit of the *Queen Elizabeth* in the Dardanelles), yet did they accomplish anything distinctive, anything to indubitably demonstrate their superiority over the 13.5-inch guns of the remainder of Jellicoe's battle fleet? They had a longer range, but lack of visibility would not permit them to take advantage of it. They threw heavier shells, but fewer of them. We believe these ships were much more valuable on account of their high speed than in consequence of their preponderance of gunpower beyond a point where the relative advantage of weight and range is very small. When maximum efficiency is reached, progress beyond is largely wasted effort.

MERCHANT MARINE

"One-Man" Control of Government Shipping

EXTRACT FROM PRESIDENT COOLIDGE'S MESSAGE TO CONGRESS

The Nautical Gazette, 12 December, 1925.—The maintenance of a merchant marine is of the utmost importance for national defense and the service of our commerce. We have a large number of ships engaged in that service. We also have a surplus supply, costly to care for, which ought to be sold. All the investigations that have been made under my direction, and those which have been prosecuted independently have reached the conclusion that the fleet should be under the direct control of a single executive head, while the Shipping Board should exercise its judicial and regulatory functions in accordance with its original conception. The report of Henry G. Dalton, a business man of broad experience, with a knowledge of shipping, made to me after careful investigation, will be transmitted for the information of the Congress, the studies pursued under the direction of the United States Chamber of Commerce also will be accessible, and added to these will be the report of the special committee of the House.

I do not advocate the elimination of regional considerations, but it has become apparent that without centralized executive action the management of this great business, like the management of any other great business, will flounder in incapacity and languish under a division of council. A plain and unmistakable reassertion of this principle of unified control, which I have always been advised was the intention of the Congress to apply, is necessary to increase the efficiency of our merchant fleet.

The Nautical Gazette, 12 December, 1925.—In no uncertain terms, President Coolidge has communicated to Congress his wishes concerning the manner in which the government's merchant fleet should be handled. His message to Congress, read this week, contains an unqualified advocacy of a "one-man" control of the operation of the government's ships, and in offering this recommendation the President has revealed his consistency of purpose in this matter. There have been times during the past year, especially in those periods when the relations between the Shipping Board and Fleet Corporation were particularly strained, when the President's attitude seemed somewhat indefinite, but that part of his message to Congress relating to shipping, which is printed on this page, removes all trace of any wavering on his part. His message this year sounds the same general note as that of last year except that this year the plea for unified control is more dominant. During the past twelve months, however, events have transpired which bring the President's hopes nearer the possibility of realization. On the occasion of his previous message very little had been heard about the principle of the separation of the Shipping Board and Fleet Corporation and the centralizing of the operation of the government's fleet under one executive. The thought had been whispered quietly in some quarters but few persons had dared to give publicity to their sentiments. Now the President has powerful support for his plan. The committee which he appointed to investigate the shipping situation recommended "one-man" control; shipowners on the Atlantic, Gulf, and Pacific Coasts met in conference in New York last spring and made similar recommendations; the National Merchant Marine Conference which, during the past six months, has been working under the auspices of the Chamber of Commerce of the United States to formulate a national merchant marine policy has, after gathering the opinions of representatives of manufacturing, farming, shipping, and labor interests, brought in similar recommendations; H. G. Dalton, who was appointed by President Coolidge a few weeks ago to study shipping conditions, has reported in favor of "one-man" control. All these recommendations will be submitted to Congress and there is every reason to believe that, with such strong backing, the plan will have the approval of Congress and be effectuated before many months have passed. The issue has been so clearly defined and given so much prominence that Congress cannot fail to act upon it at this session and every indication points to favorable action. What will happen then? We hazard the following guess: There will be a complete change in the personnel of the Shipping Board, for its present members who have so strenuously opposed the President's plan can scarcely be expected to tolerate the relegation of the Board to a judicial and regulatory body, and they will undoubtedly resign. The presidency of the Fleet Corporation will become an appointment of the President of the United States, the appointee being responsible to the President. We predict that when President Coolidge has this appointment in his own hands he will select for the office Admiral Leigh C. Palmer, who was named head of the corporation by President Coolidge last year and forced out of office a few weeks ago by the Shipping Board against the President's wishes. All of the five vice presidents of the corporation who served under Admiral Palmer have resigned since he was thrust out of office and we prophesy that these vice presidents will return when he is reappointed. When Admiral Palmer took office the operating losses of the

Fleet Corporation were in the neighborhood of $40,000,000 a year; for the next fiscal year President Coolidge has recommended an appropriation for the Shipping Board of $14,000,000, Admiral Palmer being largely responsible for the enormous saving. When Admiral Palmer is placed back in office we predict that in two years he will have eliminated the losses entirely. The day of Admiral Palmer's reappointment to the presidency of the Fleet Corporation is not far distant.

No time has been lost in getting Congress to act on the separation of the Shipping Board and Fleet Corporation, and the establishment of "one-man" control. Senator Wesley L. Jones of Washington introduced last Tuesday a bill providing for action along this line, the measure being referred to the Senate Commerce Committee of which he is chairman. Senator Edge of New Jersey also introduced a bill providing for the complete abolition of the board and the transfer of its functions to the Fleet Corporation. The bill introduced by Senator Jones calls upon the Shipping Board to transfer to the head of the Fleet Corporation the shares of stock of the corporation held by it, as well as all vessels, vessel equipment and supplies, docks, piers, warehouses, and other property which the Board now controls, with all matters pertaining thereto. Thereafter, the power and authority now vested in the board for the control, custody, maintenance, repair, employment, and insurance of this property would be exercised exclusively by the Fleet Corporation. Control over docks, piers, warehouses, and terminal equipment and facilities would be retained by Congress through the requirement that any sale thereof must be sanctioned by Congress. The construction loan fund would remain under the control of the Shipping Board. The Fleet Corporation would assume all contracts or agreements relating to the vessels and other property, except as to docks and piers. Section 6 of the bill provides for the establishment of new lines by requiring that when the board has reason to believe such additions are desirable, the fact shall be communicated to the Secretary of Commerce with a view to seeking the establishment of such a line by private interests. The bill also provides for the ownership and operation of vessels by railroad companies. This is a drastic measure, but it is in entire accord with the desires of the administration and has a good chance of passage. If the bill is passed it will accomplish practically all that President Coolidge has advocated in the control of the government's shipping affairs, and it is to be hoped that Congress will give it favorable action without delay.

Final Report of the National Merchant Marine Conference

The Nautical Gazette, 5 December, 1925.—The National Merchant Marine Conference, under the auspices of the Chamber of Commerce of the United States, has been working during the past six months to formulate a national merchant marine policy. Through the researches of its committees and in consultation with business men connected with various industries in all parts of the country the conference tackled the problem from every angle and submitted its findings at meetings held in Washington two weeks ago. The conference's conclusions as to what should constitute a national merchant marine policy are contained in its final report which is as follows:

The new situation which the United States holds in its commercial and financial relations with the rest of the world as a result of the developments incident to the World War has focused special attention upon many phases of the country's economic life. Prominent among these, because deeply affecting the future possibilities of a normal well-rounded development of the country, is that of the merchant marine.

The possession of the present large merchant fleet and the large number of Americans drawn to the sea, incident to the war, not only present special immediate problems, but offer a great opportunity for working out a solution of the national aspirations to participation in the foreign trade and shipping

of the world which, for many decades, since the destruction of our shipping at the time of the Civil War, have been more or less vaguely felt without the adoption of measures necessary to their realization.

These aspirations were expressed in the preamble of the Merchant Marine Act of 1920 in which it is stated as a national objective that there should be under the American flag a privately owned and operated merchant marine adequate to the needs of our foreign trade and national defense, and sufficient to carry the greater part of our commerce.

There is no thought of monopolizing the shipping to and from the ports of the United States. It is well recognized that vessels under foreign flags can be depended upon to carry satisfactorily a portion of our export and import commodities. But it is clear that our people are determined that they will no longer depend almost entirely upon ships of foreign countries for their foreign trade, no matter what the cost. With this as our platform we shall continue to seek the method for placing our merchant marine on a permanent commercial basis.

It has been the purpose of this conference. through the researches of its committees and its widespread consultation with business men, manufacturers, merchants, labor representatives, farmers, stock raisers, and other interested elements in various parts of the country, to formulate in a comprehensive way the principal considerations that must be taken into account in determining upon the measures necessary to the accomplishment of these purposes.

The conference has given careful consideration to all of the views before it, including a minority report submitted by the representatives of organized labor.

The conference desires to record its deep appreciation of the ready assistance in its work which has been accordel by the members and officials of the United States Shipping Board and the invaluable cooperation it has had from the Department of Commerce.

The facts developed by the investigation which the conference has carried on show that, despite the millions and even billions expended upon our merchant marine during and since the World War, relatively little progress has been made in placing American shipping in our foreign trade on a permanent commercial basis. Aside from the government-owned fleet, there is little, if any, more American shipping engaged in our foreign trade than before the war. It has become clear that the Merchant Marine Act of 1920 and the other laws relating to our shipping do not form a complete or adequate program for accomplishing the purpose so well stated in the preamble of that act.

The present government lines, which have already proved of great service toward building up a normal volume of foreign trade which, in considerable part, did not exist before, offer little assurance of permanency of the essential shipping services. These lines are being operated at the cost of a great burden to the taxpayer due to the present absorption of losses by the government which, as the present vessels wear out, would bring about great further increases in the deficits if any policy of replacement by the government should be attempted.

Shipping on the high seas is essentially competitive. Foreign nations are, in one form or another, actively aiding their shipping in this competition. They treat their shipping industry as one to be facilitated and stimulated in every phase of the regulation and administration of the industry, and to be accorded direct assistance. The United States, because of the higher living standards of its people, which must be maintained, is, above all others, the nation which must take special action to secure such shipping services as it wishes to maintain under the American flag.

In the light of these considerations this conference has reviewed with the greatest care the major phases of the problem before it, in the hope that this expression of its views may be of some value to the governmental

authorities, to those engaged in the various phases of the shipping business and to the public which this industry must adequately serve.

As a result of its deliberations the conference submits the following statement of its conclusions:

1. The steamship lines now in operation in the foreign trade of the United States, most of which are operated by or for the account of the government, are needed in the interest of the development of American foreign commerce. With relatively few exceptions they are adequate and effective for this purpose. This government tonnage is carrying commerce which before the war was, in part, served by steamers under foreign flags, and in part not served by direct steamship services, the business, if conducted at all, being carried on by roundabout routes generally involving transshipment at foreign ports. The new services established since the war have contributed very materially to the expansion of our foreign trade, notably the export market for agricultural and industrial products. Yet, only 40 per cent of the volume of our foreign ocean-borne commerce is now being handled in American bottoms.

Tonnage owned and operated by or for the account of the government should as promptly as possible be transferred into private hands, but it is vital that provision should be made for the maintenance under the American flag of the necessary tonnage to serve this foreign trade. There are, however, serious obstacles to the accomplishment of these purposes in the face of foreign competition, and there is urgent need for the enactment of measures to these ends.

A continued expansion of this trade is to be anticipated which will, in the future, call for additional tonnage, and eventually for additional lines. This, with the introduction of motor vessels and other improved types, will be necessary to carry out the national objectives as defined in the Merchant Marine Act.

2. In general the requirements for the national defense correspond with the requirements of a well-balanced merchant marine to meet the needs of our foreign trade, including, in addition to existing American tonnage, cargo liners of improved type and combination passenger and cargo liners. High-speed passenger express steamers are also needed as reserve naval auxiliaries and for postal service.

3. Our laws relating to the regulation of shipping are, in the main, based on sound principles, including the reservation of the coastwise trade for American-built vessels under the American flag, which is a fundamental part of the merchant marine policy of the United States, requiring in some cases more rigid application, and the laws for the prevention of unjust discriminations as between shippers, unreasonable preference or disadvantage to any person, locality or description of traffic, and other unfair discriminations. Some of the laws, however, require modification:

a) The Seamen's Act, besides containing provisions intended to promote the safety of life at sea, affords highly desirable protection to American labor and standards of living necessary to attract the type of citizens required to man a merchant marine of the highest class. This, however, constitutes one of the handicaps which render it generally impossible for American vessels to meet foreign competition in the overseas carrying trades. Certain provisions of the act, having no relation to the maintenance of living standards, but interfering with the morale and efficiency of the crews, should be modified to such extent as is necessary to correct these conditions, notably the requirement for the payment of half-wages at foreign ports when the seaman concerned has a record of drunkenness, desertion, incapacity through use of drugs, or other disorderly conduct resulting in delayed sailings and lack of proper discipline.

A careful investigation also is recommended as to the relation of seasonal restrictions on Great Lakes shipping to the facts of lake navigation

conditions, and as to the crew employment provisions applicable to services involving runs of only a few hours between ports. Provisions that increase lake transportation costs to the public without adequate reason therefor should be revised.

b) To place responsibility for accidents to marine workers, including longshoremen, on a definite basis similar to that established for other workmen through the workmen's compensation acts of the states, the enactment of a federal maritime workmen's compensation act is recommended.

c) Prompt legislative action is recommended to remove difficulties now encountered in connection with documentation of vessels under American laws; to correct the present unsatisfactory general system of measurement of vessels by the United States Government; and to modify the Panama Canal measurement rules so as to simplify and equalize the computation of canal dues.

d) Existing restrictions upon the sale of American vessels to foreign ownership constitute a handicap against the investment of capital in shipping and replacement of obsolete and worn-out tonnage by improved types. These restrictions should be removed, except as to government tonnage sold at depressed market values, or tonnage built or operated under contracts providing for government aid.

e) The navigation laws of the United States, and the laws and rules relating to the inspection of vessels and safety of life at sea, need revision to adapt them to modern conditions and practices. It is recommended that Congress authorize the President to appoint a special technical commission for this purpose.

f) At some ports new quarantine stations and a larger quarantine personnel are needed to expedite and reduce the cost of handling vessels. This need will become greater with the anticipated growth of the American merchant marine.

4. The attempt to combine in the Shipping Board (*a*) semijudicial regulatory duties, (*b*) certain responsibilities for the promotion of shipping, and (*c*) the executive function of administering and disposing of the government-owned fleet and other shipping property is unsound in theory and unworkable in practice. The unsatisfactory results are mainly attributable to fundamental defects in the macinery. In its very nature a board is not equipped to perform executive functions. It is therefore recommended (*a*) that the semijudicial regulatory duties embodied in maritime enactments be entrusted to a shipping board of three members; (*b*) that the functions relating to the promotion of shipping be transferred to the Department of Commerce; (*c*) that the executive duties pertaining to the administration of the government-owned fleet and the sale of shipping property be transferred to the Emergency Fleet Corporation, the president of which should be under the supervision of a national advisory board to be appointed by the President of the United States, with one of the members of his cabinet as chairman, and with the addition of regional advisory boards to sit with the national board in determining policies affecting those regions in connection with the increase, decrease, or sale of trade-route services; (*d*) that the national advisory board, with the regional advisory boards concerned, be also charged with the duty of applying, in accordance with the principles and within the limits prescribed by Congress, any system of government aid that may be authorized.

5. The Department of Commerce, which is in general charged with the duty of promoting the welfare of the various branches of commerce and industry, is the logical agency for promoting the interest and welfare of the merchant marine. To this end it is recommended that, as far as practicable the services of the Department of Commerce and those of other government departments especially relating to the merchant marine be concentrated under one head as a branch of the Department of Commerce.

6. Preferential rail rates to shipments carried in American bottoms, discriminatory duties in favor of such goods, and other similar measures should not be put into effect at the present time, but the right thereto should not be surrendered.

7. Financial aid to enable American shipping to compete under the higher living and wage standards, and higher shipbuilding, ship repair, and ship operation costs under the American flag, instead of being applied as a general ship subsidy navigation bounty applicable to all classes of vessels, should, it is believed, take the form of payment for services rendered, including (*a*) contracts for the maintenance of services to particular trade regions of the world especially important to our foreign trade and the expansion of markets for our agricultural and industrial products, and (*b*) mail contracts to provide for maintaining the higher types of service needed both in the interests of our export and import trade and for the transportation of mails. Aid for merchant vessels of special types required primarily for military or naval reserve and postal purposes should be provided for in the appropriations for those purposes.

In order to protect the government interest, aid should be limited to such expenditures as the public interest requires.

8. Besides the support secured to American shipyards through the restriction of the coastwise trade to American-built vessels, important additional shipbuilding capacity can best be maintained by establishing the American merchant marine in foreign trade on a profitable basis and limiting to American-built vessels any aid accorded ship operation. The continuance of a construction loan fund under favorable terms and interest rate, although not by itself a sufficient inducement to American shipbuilding, is regarded as a desirable assistance.

9. Taxation of shipping should, as far as possible, be simplified and made more uniform and more applicable to this industry, while double taxation of vessel earnings in the United States and abroad should be eliminated through extension of reciprocal arrangements. Other and more effective aids to shipping than tax exemption by the federal government will, however, be necessary if the American flag is to be kept on the seas in our foreign trade.

10. The policy of selling the vessels and the service facilities of the government-owned lines at reduced prices in consideration of an agreement to maintain the services for five years is recommended as a valuable expedient for disposing of portions of the government-owned fleet and securing the benefits of private enterprise in reducing operating costs and developing trade, pending determination as to which essential services can become self-supporting and which will require government aid to insure their permanence.

If, in the interest of maintaining essential direct shipping services to the various trade regions of the world, a system of trade-route and mail contracts is adopted, such contracts will constitute an important consideration in the sale of government vessels and should facilitate their disposal. The operating results secured by the Emergency Fleet Corporation in handling the existing services furnishes a practical measure, subject to adjustment on account of special conditions, of which the regional boards would have specific knowledge, to guide in fixing the considerations in trade-route and mail contracts.

11. Until the disposal of its vessels is accomplished, the government should carefully avoid competing with any regular American flag service under private operation. A particular obstacle to the purchase of vessels by private capital lies in the uncertainty as to what is to be done with the residue of the government-owned fleet so long as it remains available for repair and operation backed by federal appropriations. Additional tonnage should be placed in service only as conditions in the carrying trade com-

mercially justify it. The best test of the desirability of new shipping services will be found in the readiness of private capital to invest in them.

12. Surplus vessels, particularly those of small or non-competitive types, not salable to American citizens and not required in connection with present or prospective services, should be sold in the world market. Unserviceable vessels should be scrapped, giving the American market preference within its capacity to absorb the scrap material without damage to other industries.

13. Pending disposal of the government vessels to private ownership, the government must continue the operation of the essential services to meet the needs of commerce. Charter to private operators has been attempted but found impracticable under existing conditions. While there are serious disadvantages in the M. O. 4 agreements under which government vessels are now operated by managing agents, there being little inducement to the operators to purchase the vessels and services, some such form of operating agreement appears to be necessary at the present time. In order to facilitate disposing of the lines on advantageous terms and putting the services on a permanent commercial basis, it is of particular importance that the managing agents be parties who are able and willing to become purchasers.

14. In addition to providing for the maintenance of a merchant marine in private hands under the American flag adequate to the needs of our foreign trade and national defense, it is of great importance that measures also be taken to aid the development of the widespread organization and facilities necessary for the success of such a merchant marine, including American agencies in foreign ports, adequate terminal facilities in all such ports, American banking institutions in foreign countries, free trade zones or free points at proper points on our coasts to develop transshipment trade, an increase in American marine underwriting, schools for training officers, seamen, and shore personnel, and maximum cooperation of the consular, diplomatic, and trade promotion agencies of the government.

15. In order to offset the practice of foreign exporters and importers of specifying wherever possible that their goods be shipped by vessels flying the flag of their nationality, American merchants should similarly favor American vessels in connection with their import as well as their export shipments. It also is of great importance that general popular patronage of American freight and passenger vessels by American citizens be stimulated in every reasonable manner.

MISCELLANEOUS

Why the "Constitution" Won

The Scientific American, December, 1925.—In seeking after the causes which led to the victories of the *Constitution* in her famous duels with British frigates, we are carried back to the years before a stick of her timbers had been laid. In a letter, dated January 6, 1793, Joshua Humphreys, her designer, wrote to Robert Morris describing the type of ship which the United States should build as the beginnings of its modest navy, and he said: "As our navy for a considerable time will be inferior in numbers, we are to consider what size ships would be most formidable and be an overmatch for those of the enemy. . . . . These ships should have scantlings equal to 74's (ships of the line). . . . . Frigates built to carry twelve- and eighteen-pounders will not answer." And Mr. Humphreys recommended twenty-four-pounders as against the eighteen-pounders carried by frigates of that day. Speaking of his design, in another letter he writes: "They are superior to any European frigate, and if others (of the enemy) should be in company, our frigates can always lead ahead and never be obliged to go into action but on their own terms, except in a calm." The *Constitution* and her sisters were built as Humphreys suggested, and in

his book, *The Frigate "Constitution,"* Ira N. Hollis, a retired officer of our Navy, says: "With uncommon foresight, Mr. Humphreys made the hull frames, the planking, and the masts of his ships fully equal in dimension to those of a line-of-battle ship." Says Hollis: "The *Java,* for instance, fired eighteen-pound shot at the *Constitution,* whose sides were from seventeen to twenty inches thick, while the latter fired twenty-four-pound shot at the former, whose sides were from eleven and one-half to fifteen inches thick."

The farsightedness of Humphreys gave to the young republic in the *Constitution* and her sisters an ideal vessel for the conditions that confronted them. The *Constitution* could not fight a line-of-battle ship; but if these came upon her, she was fleet enough to escape them. On the other hand, she was more powerful and swifter than the eighteen-pounder frigates of that day and could engage single ships with a fair certainty of success; and she could escape from a squadron, as she did off the Jersey coast, by virtue of good seamanship and fast sailing.

But powerful batteries, sweet lines in the hull, and a vast spread of canvas would avail nothing without good men at the guns below and on the yards aloft and, above all, a commander with resourcefulness and initiative; and the *Constitution,* as her engagemtns showed, was strong in these human factors. The British, because of their proved superiority over the French when battles were fought at pistol range and ships carried by boarding, had grown careless in gunnery. Gun practice was practically unknown, whereas our gunners were exercised regularly with the clumsy weapons of that day. The *Guerriere* was of about the same size and power as the *Java;* and so good was the gunnery of the *Constitution* that every mast was shot out of the *Guerriere* and her hull was so frightfully riddled that she was in a sinking condition when she surrendered.

The American people should subscribe the $500,000 necessary to save the *Constitution,* not only for her victories, but because she marked a new type of ship as notable in its way as was the *Monitor* of the Civil War.

The Line of Disarmament

By Sir Herbert Russell, *The Naval and Military Record,* 25 November, 1925.—I confess frankly that I would very much rather have to write about an increase in naval pay or the ultimate prospect of marriage allowance for naval officers than upon the stultifying of the naval profession. I do not want to see any more war. But I am not one of those idealists who believe that the best way to insure against any more war is by throwing away our weapons and murmuring beatitudes to all sorts of nasty people who still inhabit this very imperfect world. We owe our greatness as a world power to the navy and to that quality of self-reliance which created and maintains the navy. Disarmament is the negation of national virility. It is distinctly worse in this respect than the doctrine of being too proud to fight. Every self-respecting individual retains the right to take his own part. He does not trust to a League of Neighbors to tell him whether he is right or wrong; whether he must go home quietly and nurse his sense of grievance lying down, or whether they will see him put right by some mysterious process known as "sanctions."

So that's that! But in the present trend of things I quite realize that it is just about as futile a sentiment as was the attempt of Sidney Smith's curate to please the dean and chapter of St. Paul's by stroking the dome of the cathedral. Reduction of armaments is coming—nay, is here, for apparently the Admiralty cannot wait until the thing is internationally settled. And so, perforce, we must face it and consider what line it is likely to take and how far it is likely to go.

I suppose we shall come to the conference table at Washington, or Geneva, or wherever the pacifists decree, prepared to abide by the existing 5-5-3 ratio. But if we are going to cut down naval armaments to such a

point as the optimists profess to believe, we shall be getting down to the level of other one-time great sea powers, which are now in a secondary category, and then we shall be confronted by a new "orientation"—whatever precisely that means.

France, never anything if not logical, is already striking an attitude upon the subject. She says that any further limitation of armaments must mean equality of armaments. Of course, she is thinking of herself in relation to the existent Big Three. She does not mean that the Chinese Navy must be on an equal footing with her own. She means that, with her traditions and her maritime interests, she should be as strong as any other great power at sea. The simple reason why she is not now attempting to be as strong is because the franc has gone to pot. But she clearly sees opportunity to take occasion by the hand. The other great powers must reduce their naval armaments. She will stick to what she has got until they come down to her level. Then, if the process continues beyond that stage, she too will take a hand in the game. This, as I understand it, is her view, and a strictly logical one.

As far as I am aware, Italy has not revealed her attitude upon the subject. Signor Mussolini has, indeed, been making some martial speeches about the necessity for safeguarding national honor and territorial integrity, but these may be taken as political rather than strategical. It is reasonable to assume, however, that if France really should take up such a position as she herself suggests, Italy will declare for the same principle. Both of these countries since the Armistice have been following a strictly defensive policy of naval maintenance. There is no aggressive objective in the outlook of either. This fact must needs materially strengthen any claim to equality in the ratios of the future.

But is the League of Nations going to share in such a view? Is the international disarmament conference which will be born of the Locarno compact going to acquiesce in such a differential contention? Disarmament means disarmament for all the signatory powers to the League, in relative degree. If France and Italy choose to say, as they perfectly well may, that the relative degree in their case will not be reached until equality with the Big Three is more or less realized, then we shall be faced with a very interesting situation.

It is true to say that the relative positions which France and Italy now occupy in the Washington ratio were entirely voluntary. They had decided upon their naval policies before the conference was called, and they adjusted their respective positions according to these decisions. Great Britain, the United States, and Japan would have found no reason for opposing proposals of a much higher standard of naval strength on the part of either or both. But they found as assurance of good faith in the readiness of the Big Three to reduce their own standards, which caused them to conclude that no departure from their own economic policies was necessary.

Limitations of naval armaments by the nations of the League really comes to a question of pooling. All agree to employ the full weight of their strength against any unwarranted aggression. But the United States is not in the League. Her attitude throughout certainly indicates that any idea of pooling is quite outside her inclination. She will disarm, by agreement, but without any pledge beyond the mere fact. She undoubtedly wishes the League well, but otherwise will have nothing to do with such a motley affair. Here is promise of another little tangle which will be pretty difficult to unravel.

Russia nobody seems to be troubling about, and yet she presents a factor of sinister possibilities. Her avowed game is to upset anything and everything which the League of Nations may accomplish. Probably there is a general feeling that to whatever conceivable degree the reduction of naval armaments may be carried by the other great powers, she cannot become a formidable menace to the united front they would present against any ag-

gressive action on her part. Remembering the attitude of the "Red" Admiral at the Rome Conference of minor naval powers in the spring of last year, it seems pretty safe to assume that she will take no part in any international disarmament agreement.

The French Government has been considering certain proposals of the lines upon which further disarmament might proceed, drafted by a cabinet secretariat, and this document is very enlightening as indicating the general principles which are likely to form the basis of any scheme with this end in view. The first clause provides for a review of the military, financial, and geographical conditions upon which the power of a state depends in war. This review is obviously designed as a preliminary condition to any question of relative requirements. It is bound to be fraught with controversial considerations, because no country is going to put her own assessment lower than she can help, and the spirit of the conference is likely to be put to a pretty searching test in the very early stages of it.

The elements which constitute the armed force of a state in peace time, the war-time potentialities of such armaments, and the period required to develop to a war footing are the next steps proposed for investigation in the French plan. The aim of this inquiry is to consider the possibility of establishing equality between states, so far as their material resources are concerned, with a view to the employment of these in a common plan of action. This seems rather complicated. As far as I can follow it, the idea is that all the conferring powers inferentially agree that they are not going to fight one another any more, but with the reservation that they must be prepared to pool an individual equality of strength against any one which suddenly becomes aggressive. This "equality of strength" suggests a very contentious subject. How is it to be reconciled with the preliminary clause, which clearly implies the need for a relative ratio in accord with the size and responsibilities of a state?

Again, the principle of equality of material resources goes by the board in the last clause of these French proposals. It is laid down that no power shall be permitted to maintain armaments enabling it, in case of resolving upon an act of aggression, to dispose of armed forces superior to those which could be assembled by the power attacked and by the League of Nations in defense of it. The academic phraseology of the scheme may cause the ideas which it embodies to appear more complex and contradictory than they really are. But the admitted necessity for ensuring the means of dealing with any violation of the compact of disarmament by force of arms seems rather like a big fly in the ointment. In the first place it implies that the causes which have caused war in the past still exist and may again cause war. If not, why the necessity to provide against them?

Is it not a fact that the real definition of disarmament is a grand alliance of the nations? When Great Britain and Japan formed an alliance at the beginning of the present century the immediate result was that we reduced the Chinese Fleet, which included six battleships of the *Glory* class and two of the *Barfleur* class, to a small cruiser squadron. When Great Britain and France concluded the Entente, France practically carried out naval disarmament in the Channel. The truth is, I believe, that all countries are, and have long been, willing to restrict their aramaments to very small limits so long as they are not nursing any aspirations which are likely to ultimately force them into an aggressive attitude. But if they do nurse such aspirations, whether from ambition or necessity, then it is difficult to conceive how they can enter into any disarmament covcenant in that spirit which alone can guarantee the effective endurance of such a compact. Political exigencies or economic pressure may induce participation in the movement, but the basic cause for a big armament remains.

Disarmament is a pledge of a sincerity which is assumed to be stronger than the claims of national interests. Arbitration can only satisfy one side. War means arbitration without an alternative: the beaten side must

accept the verdict. A decision by an international court is only a matter of moral obligation. The Council of the League of Nations apparently realizes this, because it has always admitted the necessity for a sufficient strength of military resources to enforce arbitration if necessary. Such an anomaly is probably quite inevitable.

Last summer it was reported that Lord Parmoor had offered to the League of Nations the services of the British Navy to enforce its "sanctions." His lordship denied that he had made such an offer, but probably this referred only to the form in which the suggestion was put. The result was a controversy as to whether it might not be better to maintain the British Navy intact on this understanding than to submit to disarmament on the lines of Mr. Ramsay MacDonald's "golden dream." But a very little reflection served to demonstrate that it was an impracticable proposal, first of all because the British taxpayer would never consent to bearing the whole cost of doing the police work of the League of Nations, and secondly, because the other great powers would never consent to Britain maintaining her fleet intact while they disarmed their own.

When all is said and done, it is difficult to conceive of any better line to follow in the restriction of naval armaments than the principle that was laid down at Washington, of relative strength according to geographical interests and responsibilities. Under this standard the British Empire ought to have a marked preponderance in the international ratio, although the United States is not very likely to acquiesce in this. Where the Washington Agreement has failed is in the elusiveness of its details. It has merely diverted competition instead of restricting it.

Disarmament Difficulties

By Sir Herbert Russell, *The Naval and Military Record*, 9 December, 1925.—The attitude taken by the French press, with a unanimity which is very uncommon in any expression of opinion in France, upon the suggestion that submarines should be abolished as a weapon of naval warfare, must necessarily give pause to the enthusiasts who are now preaching international disarmament in such a note of optimism. The "sympathy" with which Mr. Mackinnon's proposal was received becomes rather meaningless in face of the declaration that it is impracticable. The contention of the French is strictly logical. The submarine is the defensive weapon of the weaker power. France has become a weaker naval power since the Armistice from a variety of reasons, which are immaterial in considering the result. She practically says that it would be unreasonable to ask her to forego her principal means of defense; in fact, she makes it pretty clear that she has no intention of foregoing it.

This is simple common sense. At the same time it constitutes an argument which suggests a very awkward snag across the path to international agreement. In effect, it disclaims belief in the feasibility of disarmament. For if France declines to forego what she has come to regard as the most important weapon in her present naval armory, is this not tantamount to say that, whatever other nations may choose to do, she, at any rate, intends to keep her powder dry? Such an attitude does not impress me as particularly favorable to disarmament. It is contrary to the spirit by which alone disarmament can become a genuine and sincere *fait accompli*.

More deliberately blunt is the sentiment expressed by Senator Hale. I have always regarded Senator Hale as one of America's leading statesmen, a man with breadth of political vision and wedded to the cause of peace. This confession on my part may be equivalent to revealing a want of knowledge of American politics. Mr. Hale talks with an air of "no damned nonsense," which at least enables us to see where we are. He says that his country "must approach the question of a new conference on the limitation of armaments, not as a great country willing to make a great

sacrifice in the interests of a world limitation of armaments, but as a country asking others to make the sacrifice."

The other day when I was protesting against Mr. Hoover's blatant irritation that the British Empire should be making a good profit upon its rubber, thereby helping to pay its debt to the United States, I was informed by an American that "you do not understand us." Possibly not. But I do understand the meaning of simple English words, and what Senator Hale has said on the subject of international disarmament does not really call for much mental effort to master. Frankly, I think he is perfectly right. He is merly reflecting what has become a habit of thought in his country by demanding that other nations should make the sacrifice. My only point of uneasiness is as to whether other nations will be such fools as to do it.

France, at any rate, has pretty clearly implied that she will not, and with France, I think, may be ranged Italy. Some little time since France expressed another point of view on the subject of the reduction of naval armaments—or, rather, more correctly speaking, her Ministry of Marine did. This was to the effect that limitation of armaments, to be an equitable arrangement, must be upon the principle of perfect equality for all the great naval powers. Whether she would want to insist upon this view now remains to be seen, but it is a principle which is bound to raise strong and probably insuperable opposition. The measure of a country's defensive requirements in naval armament must be determined by the extent of the interests which she has to defend, and to postulate that all the principal naval powers are equal in this respect is simply ridiculous.

The chief difficulty in the whole business, to my mind, lies in the instinctive sense of the artificiality which besets the principle of restraining international strength. We are asked to accept a premise which of itself is illogical. The basic assumption upon which the idea of disarmament rests is that nothing now remains in this benignant world against which it is necessary to continue armed at all. We take it that we have done with war, save, perhaps, in the sense of those tribal little affairs which "Punch's" cavalry subaltern defined as "mere vulgar brawls." If this hypothesis is really justified, why bother about "ratios"? If it is not justified, why disarm at all?

The answer to the latter question, of course, will be found in the economic element. The need for retrenchment is a very much more potent factor than sentiment in the movement which is now gravitating towards another international conference. And here we come to another element of difficulty. The United States can afford to go on maintaining a fleet of any dimensions for which she can find men without feeling any appreciable economic pinch. Japan is probably better able to continue keeping up her present standard of sea strength than we are. It seems that the recent reports as to naval economies in Japan have no reference to programs alrady sanctioned, and our own admiralty have no knowledge of them at all. In that eminently practical empire the population is not being skinned by a riot of political competition dedicated to "social reform." France and Italy have renounced big fleets, not because they wanted to set examples to the rest of the world in this respect, but simply because they cannot afford them.

In the element aspect the richest nation is the strongest nation. And the strongest nation has a not unreasonable desire to remain so. That is why the "higher Socialism" which is a fundamental principle of the League of Nations is so flatly rejected by the United States. She is not going to pool her prestige even for the privilege of conserving her wealth. Prestige with our own champion idealists does not appear to count; they probably think it is old-fashioned as war itself. I do not suggest that they are either unpatriotic or disloyal, but in their beneficent survey of mankind from China to Peru they lose all sense of relative proportions.

This may be but the defect of virtue, but it is a defect which holds a very serious possibility. Will Great Britain, at the next conference table, be prepared to make that sacrifice which Senator Hale demands in the name of his "great country"? Will she, in other words, accept the mandate of the United States, which, if she goes to Geneva at all, will pretty certainly arrive in a didactic mood? Or will she ask by what right Senator Hale, as typifying the American view, demands the principle of sacrifice from other nations to the glory and aggrandisement of his own, which has certainly not overdone the sacrificing business in its relations with the rest of the world?

France, at any rate, is consistent in her bland denial of any intention to renounce the submarine. The attitude of the United States is very speculative. She has professed a genuine desire for another Washington Conference. But will she, in her present-day pose of superior aloofness, consent to take part in a Geneva Conference? Will she carry altruism to the extent of waiving that presumptive right of initiative which is the preliminary to demanding further sacrifices? Senator Hale does not encourage us to believe so. On the contrary, he distinctly assumes a "cock of the walk" attitude towards all the inferior nations of the earth, which does not impress me as likely to create the best atmosphere in the world in which to persuade the other powers that sacrifice is up to them.

It has been suggested that if the United States shows any demur to coming to Geneva, the remainder of the great naval powers should get together and agree as they may think best without any further reference to her. This is feasible, but eminently undesirable. In such an event it is not unreasonable to suppose that America would mark her resentment by launching out into a great program of naval expansion. Such a policy would render further reduction of armaments by the rest of the world impracticable, unless they were prepared to let America establish hegemony of the Seven Seas. I agree that in the ultimate recourse the common sense of American public opinion is very unlikely to sanction any such policy of mailed-fist isolation, but it is a contingency which, Senator Hale must pardon us for saying, utterances such as his at least bring to mind.

Anyhow, the problems of disarmament are clearly punctuated with some big difficulties. The League of Nations can do a good deal, but it can do nothing in the case of a great power which stands aside, as it were, with a supercilious smile. Neither can it do anything in the case of powers who very blandly announce that, whatever others may choose to do, they intend to go on building submarines. Some of us—probably a great many of us—may have our own views upon the subject of pooling our strength, our wealth, our traditions, and our national virility with all comers (and there will always be plenty of comers to such a feast), and may even think that the United States is right. But let her then at least be consistent. She it was who originated the idea which resulted in the Washington Conference, and she it is who has been spasmodically preaching disarmament ever since. On Senator Hale's terms, are we to understand? And what really is the sacrifice which he says America is *not* called upon to make?

Naval Bases

By Sir Herbert Russell, *The Naval and Military Record*, 2 December, 1925.—We are hearing a lot about naval bases these days. And the reason is that naval operations are dependent upon the existence of bases in a greater degree than ever before. Likewise we are confronted with a new and somewhat indefinite strategical outlook. During the early years of the present century the character of the next war was very apparent. Today the character of the next war is very conjectural. The "strategical zone" is only determined by the cruising grounds of other great navies, now reduced to two in number, and not by any consideration of a clear and deliberate menace. We look towards the waters in which these two great

navies are to be found, not because they constitute a threat to ourselves, but simply because they are there. This is quite in accord with the principle of response which is the basis of sea power: if there were nothing to respond to the *raison d'etre* of the navy would have disappeared.

The word base is being used in a more generic sense than formerly. Originally it had a differential meaning, as apart from a dockyard or an arsenal; now the two are frequently merged. I do not suggest there is any misapplication of the term in this. A dockyard port may be also a base—as in the case of Malta—but a base need not be a dockyard port—as in the case of Scapa. Broadly speaking, a base is a rendezvous and a recuperating haven for warships, where they can lie snug from all weather, revictual, and do such refitting as does not necessitate drydocking. Its value is necessarily determined by strategical situation. Nobody had ever heard of Scapa Flow before the German menace took unmistakable shape; nobody hears of it now except as a memory of the Great War. It is a sheltered anchorage, but it is no longer maintained as a naval base, any more than is Berehaven, a *point d'appui* dominating the western approaches. The Irish Free State would be glad enough for the British Fleet to make as much use as it choose of Bantry Bay, for the sake of the money this would bring into that corner of the distressful country. But since there is no rival squadron cruising within the zone of the western approaches, why spend money in County Cork?

The French classify all their naval bases and dockyards under the general definition of *ports de guerre*. But a base which is merely the headquarters of a minor naval command needs differentiation from a first-class dockyard A base may be hastily improvized; a dockyard is the growth of many years. Nowadays the idea of a naval base is entirely associated with a place suited to the conduct of operations. In the days of sail there was not necessarily any such implication. The advent of steam brought with it the necessity to establish a chain of coaling stations. These places were selected with much more direct reference to strategical possibilities than were many of the old naval stations of the era of tacks and sheets. It was obvious that the destruction of them would be the aim of any enemy; therefore defensive measures were necessary. As far as practicable the coaling stations were sited in spots already fortified. This principle ensured one of the most essential conditions of an operations base: the ability to keep any superior blockading force at a respectful distance. The evolution and growth of the ship imposed problems which had caused little trouble in the days of sail. A landlocked haven and a nice smooth beach enabled a ship to be careened for scrubbing or caulking, or underwater repairs. The adoption of iron and the rapid increase of displacement rendered this easy method impracticable; the same causes put the patent slip out of the question, and the dry-dock became the only method of underwater maintenance.

As an example of the rendezvous base Ascension may be mentioned. It was for many years the headquarters of the West Coast of Africa Squadron, the captain of the guardship being the governor of the island *ex officio*. Before the opening of the Suez Canal it had a very strategical value. Ships then kept the sea for long periods. Ascension was well placed as a base of operations for the suppression of the slave trade. It became a coaling station of considerable importance during the early days of the steam fleet. But under changed conditions it gradually languished to a negligible value; the admiralty definitely abandoned it about three years ago; nor is it easy to conceive that it can ever again become a British naval base. At the same time we must take very good care that it never passes into other hands, since it would make an ideal base for ocean submarines operating against our South Atlantic trade.

With one of his characteristic "gestures" which won him so much applause from those who did not understand things, the late Lord Fisher

abolished many of our naval bases. In face of the menace near home which was then assuming sinister shape there was some justification for his action. But it amounted to a virtual renunciation of the old doctrine that the world is the parish of the British Navy. It was carrying concession to the current strategical situation drastically far. We realize this better now that that current strategical situation has passed, and our mental vision instinctively turns to the other side of the world. Of course, it is true to say that to bring most—probably all—of those abolished naval bases up to date in accommodation and resources would have involved a colossal expenditure and that the very nebulous question of their war value after being thus brought up to date did not yield justification for such expenditure. Esquimalt, for instance, had never been anything but a rendezvous base. It seemed inconceivable that it should ever become an operations base. Yet there is this to be said: had we retained Esquimalt as a naval establishment might not this have proved a stimulus to the very languid interest of Canada in the whole question of imperial naval defense?

Modern naval warfare partakes largely of "there and back" tactics. This is inevitable owing to the restricted sea-keeping endurance of power driven ships as compared with sailing vessels. The general adoption of oil fuel has probably done something to relieve this condition, since ships can replenish at sea in fine weather, or at some convenient rendezvous, and when employed in blockade patrol might manage to fill their tanks without such long absence from station as would be necessitated by filling bunkers. In fact, it is correct to say that oil fuel can be brought to a warship, but a warship has to be brought to coal. The modern capital ship is essentially dependent upon a base. During the last three years of the war there was no case in European waters of a capital ship operating more than three hundred miles from her base. It may be argued that the war presented no opportunities for wider movements. Such a contention is to deny the practicability of sending the Grand Fleet into the Baltic as advocated by Fisher. That practicability, in its turn, rested upon the ability of the Grand Fleet to establish a base in the baltic after gaining that zone—a contingency which the preponderance of naval opinion regarded as altogether speculative.

The frequent references to the development of Singapore as a naval base are not strictly accurate, since Singapore has been a naval base for many years past. What is proposed is to render it capable of receiving and docking battleships, so that it may serve as a vantage point for the conduct of what it is now the fashion to term major operations. A modern naval base demands adequate defensive qualities, since the mere fact of its harboring a fleet is sufficient assurance that it will form a mark for enemy attack, by sea, or land, or air, if such attack be possible. Singapore is particularly well situated for defensive purposes. Hongkong on the other hand, is exposed to land attack. A descent on the mainland, and the occupation of Kow Won by heavy hostile artillery, would render the naval establishment on the island untenable. The Ly-ee-Moon Pass lends itself to mine laying on a scale which would make an attack by sea a very hazardous business.

Australia is just now deploring her lack of naval bases, and yet she possesses fine harbors, with natural features eminently suited to the purpose. Her real plaint, of course, is that none of these is strategically suitable for offensive operations. The United States possesses some excellent potential bases in the Pacific, but when she agreed at the Washington Conference to accept the *status quo* with regard to the fortifying and developing of these she was stultifying herself more than she realized at the time.

Cruiser warfare has the advantage that it can improvise its bases. Admiral von Spee had made arrangements to operate from the Caroline and Marshall Islands in the early days of the war. The *Emden* took prizes and, when necessary, escorted these into some remote spot, so as to replenish her supplies from them at her leisure. Submarine campaigning lends itself

very much to this somewhat desultory principle. But capital ship operations demand permanent bases, and if these are at all remote from a great dockyard, they must be converted into dockyards themselves. Intermediate bases are likewise essential to the maintenance of communications; hence we find that the Singapore scheme is giving a new lease of life to Trincomali. Rojdestvensky's disaster was largely due to the fact that he had no base to make for before entering the zone in which he might expect to be challenged to battle, whereas Togo was operating comparatively close to his own base.

To dwell upon the necessity for bases (in the fullest significance of the term) within any region that may be deemed a strategical zone is but to explain the obvious. And yet there are well-informed people who oppose the Singapore scheme. Presumably they decline to accept the old axiom that battleships are cheaper than battles. It is true that one of the principal objections to the great capital ship is her dependence on bases, and the costly character of the bases she requires. But it is clearly an objection which we must accept and provide against so long as we continue to maintain a capital ship fleet.

Frank Statement by Army Aviator

Army and Navy Register, 21 November, 1925.—One of the most candid statements on the Army air service situation has been furnished as a "supplementary" document submitted to the President's aircraft board by Major B. Q. Jones, A. S., on October 7, 1925, and now just available. It follows:

When I appeared before the committee on September 28 the question was put to me whether or not there was any acute dissatisfaction in the air service. My answer to that was that I did not consider the dissatisfaction acute, but rather that it was general.

I want to state to the committee just what I meant by general dissatisfaction. The only acute situation that I know of in the air service is the fear on the part of certain elements that they might not be able to profit by the acute public attention focused on aviation at this time to put across their separate air service idea. I want to state definitely that I believe that the agitation which has existed for the past several years for a separate air service has done more than any one thing to make the air service discontented. It has kept the air service from paying proper attention to their real duties, and has diverted their attention from their true jobs over the excitement of the thought that there might possibly be created a separate air service. It must be remembered that there is bound to be dissatisfaction during any period immediately following a war, with its attendant excitement and its high purpose. The monotony of routine duties has set in, with its cycle of drills and training. Such a situation, with the future holding dim prospects for promotion, is bound to create discontent, but this is not peculiar to the air service; the whole Army is in the same boat; nor is it peculiar to the Army, as human beings in subordinate positions in any walk of life are by nature discontented.

Motive Behind Agitation

The fundamental motives behind this whole agitation for a separate air corps are:

First. Desire for more rapid promotion.

Second. Hopes of early retirement so as to be able to lead an independent existence.

Third. The natural human desire to be, for once in their lives, upon the top of a new idea that will carry them along to high positions, realizing, as most of them do, that this may be their only real opportunity in life to get something in a hurry.

The fundamental troubles with the Army air service itself are:

First. The tendency of all flyers to place themselves upon a pedestal of "I am a flyer," with the result that the feeling has been developed that they must be given special consideration, with the consequent development of individualism and an attitude of none too much respect for those who are nonflyers and who are not participating in their risks.

Second. The human tendency on the part of flyers to segregate themselves into a special fraternity and create a special caste.

Third. The development of cliques among air service officers and its ruinous effect upon impartial administration.

Fourth. The use of "grapevine" and personal channels to attain their private ends.

Fifth. The development of bureaucracy in the office, chief of air service, and the evasion of the spirit of the "Manchu law."

Sixth. The policy which allows detailing junior officers (lieutenants and captains) in the office, chief of air service, to administer the affairs of aviation.

Seventh. The low standard of professional flying ability on the part of a great many air service officers.

Eighth. The incubus of impostor flyers.

Ninth. The lack of discipline in the air service.

Tenth. The general attitude of disloyalty to the Army.

Eleventh. Full use has not been made by the air service of the latitude given it by the War Department to train its personnel, to develop tactical organizations, and in the administration of its own affairs. The favoritism which the air service has enjoyed is best illustrated by the fact that, while the whole Army suffered a cut of 4.65 per cent, or $5,603,773.67, in the funds appropriated for the fiscal year 1926, as compared to those for the fiscal year 1925, the air service funds actually increased 10.87 per cent, or $3,585,571.20

Weakness of Proponents

The weakness of the stand of the "separatists" has been most clearly evidenced to this committee by the gist of their testimony.

The claim was made that the War Department has seriously delayed in answering correspondence and in rendering decisions. I know from my own experience that there have been long delays in the air service in replying to communications, and where months have been taken to render decisions that should have been rendered in the course of a few days or a few weeks. Similarly the War Department was criticized for over coordination. I know of no administration that lays so much stress on thorough coordination as does the air service. I have a case in mind involving maintenance of air service equipment, wherein the board of maintenance engineers held its conference last December and no real decisions have yet been made on their numerous recommendations which vitally concern the air service.

A typical illustration of the attitude of a great many air service officers was evidenced by one officer who testified before this committee and evaded a question put to him as to whether or not he considered himself both an aviator and an Army officer, leaving the impression with the board that he was not an Army officer and that military aviation was so entirely removed from military matters that one did not need to be an Army officer to be a military aviator.

Also this same officer made the statement that the purpose of the air service was to protect the Army. Such a statement only evidences the ignorance of air service officers of the true rôle of military aviation. It is only necessary to cite the case of the little value of aviation in the Riff war to show that military aviation is but an adjunct and is not a substitute for the Army. The reason airplanes have been of no material value in the

Riff war is simply that "you cannot hunt ants with eagles." It is the ground troops of the French Army that are the backbone of France's offensive against the Riffs.

Another evidence of the misconception on the part of the average air service officer of the true rôle of military aviation, and also of the little attention they have paid to military subjects, was the testimony before this committee of one officer who had just attended the course at Leavenworth, and who criticised that course because its doctrines preached teamwork and not individualism. That officer apparently was not aware of the fact that the doctrines laid down for instruction in aviation matters emanate from the office, chief of air service, itself. Also that officer was apparently not aware of the fact that the reason why great consideration is now being given to the use of aviation in the studies at Leavenworth was primarily because the senior officer instructor at Leavenworth coordinated thoroughly with the staff of the school and educated them on the use of aviation, with the result that military aviation is considered as one of the all important subjects for study at Leavenworth.

"Picayunish Attitude" of Air Service Officers

Furthermore, the picayunish attitude of a great many air service officers is evidenced by the criticism leveled at the Army on the grounds that a lieutenant did not carry the same weight in a conference as did a general. The ridiculousness of this is too apparent to merit further discussion.

In order to correct impressions which the public must have gathered from certain statements in the press as to the air service having practically no equipment for war, I wish to set forth just what the situation is.

Based upon the report of airplanes on hand in the air service in the standard and substitute for standard classes only, and only considering those in commission and in service, we had a total of 1,000 airplanes, of which 798 were actually flying and 202 in reserve, but which could be placed in flying condition within anywhere from twenty-four hours to two months, depending upon the stress placed upon the repair work.

Now of these we only require to initially equip our authorized number of pursuit squadrons, a total of 144, while we actually have on hand 159, with forty-five more on order to be delivered in the immediate future. Therefore we have actually a surplus over the needs of the tactical pursuit squadrons of fifteen, with a possibility in the near future of sixty.

Similarly, our authorized observation squadrons only require an initial equipment of 142 observation planes, whereas we actually have on hand in the two classes named above 769 with eighty-five more on order, or an excess of 27, and with those on order an excess of 712.

For bombardment, we need seventy-two bombing airplanes, but we have on hand ninety-seven, or an excess of thirty-five.

For the authorized attack squadrons, we need thirty-two attack airplanes, of which we have none on hand. However, a very successful adaptation of observation airplanes has been made for attack use. Therefore it would be very easy to adapt some of the 627 excess observation airplanes for attack purposes.

Now it is desired also to make a little comparison between the French air service and ours.

As far as I can understand from the meager information furnished me, the French pursuit squadrons are equipped with airplanes of only 300 horsepower, with a high speed of 140 miles, and a service ceiling of 16,000 feet. The *MB-3* airplanes, which were long ago relegated by the air service to the substitute for standard class, are equipped with 300 horsepower motors, with a high speed of 152 miles, and a ceiling of 24,900 feet. Even the *PW-8*, which has also been relegated to the substitute for standard class, and which is the equivalent in performance to our standard pursuit (the

PW-9), is equipped with a 400-horsepower motor, has a high speed of 168 miles, and a ceiling of 21,500 feet.

The French bombardment squadrons are equipped with single and bi-motored airplanes. Their single-motored airplanes are equipped with 300-horsepower motors, carrying only 682 or 990 pounds of bombs, with a high speed respectively of 108 and 96 miles an hour, and ceilings of 19,000 and 15,000 feet, respectively. Their dual engine bombers are equipped only with two 265-horsepower motors, capable of carrying 1,980 pounds of bombs, with a high speed of eighty-five miles, and a ceiling of 14,700 feet. Against this, our bombardment airplanes, which were designed during the war, are equipped with two 400-horsepower motors, capable of carrying normally 1,500 pounds of bombs, with a high speed of 100 miles an hour, and a ceiling of 10,000 feet, which with superchargers is increased to something over 15,000 feet.

Also the observation airplanes with which the French are equipped have 300-horsepower motors, with a high speed of only 117 and a fraction miles an hour, and a ceiling of 17,500 feet. Our present substitute for standard observation machines are equipped with 400-horsepower motors, have a high speed of 118 miles, and a ceiling of 14,500 feet. The old *DH-4-A* airplanes, built in the war, were equipped with 400-horsepower motors, at a high speed of 123.7 miles an hour, and a ceiling of 17,600 feet.

As far as I can gather, the British organizations are still using the war-designed *DH's,* and the *Vickers Viny,* which corresponds to our *Martin* bomber, while their pursuit squadrons are equipped with planes with a high speed of 148 miles.

From the above, it can be seen that instead of being worse off, our air service is really better off than that of the two leading foreign nations.

If the testimony given before this committee for separation of the air service from the Army is boiled down, it amounts to nothing more than accusing the War Department of delayed action in correspondence and in rendering decisions, in a desire for separate promotion, and in a desire for a separate budget.

Possible Remedies

There are only four possible decisions which I can see which can be made to remedy the situation in Army aviation:

First. The creation of a separate department of the government.

Second. The creation of a separate corps of the Army.

Third. Leave it as it is, provide the air service with a separate budget, and give it a special promotion list with constructive service for active flying service, retaining the officers upon the lineal list in the Army, so that if it is ever necessary for them to return to other branches, they will revert to their places on the lineal list without injustice to their nonflying brother officers; and in order to relieve the overhead which is bound to result (and which I go into below), the adoption of a policy of using mechanic pilots and mechanic observers whose tour of duty will not average more than five years.

Fourth. The procedure outlined in the third decision, together with a provisional organization to prove or disprove the value of air power as an agent for international peace.

Separate Department.—A separate department of the government is not feasible, as military aviation, i.e., attack, bombardment, observation, and pursuit, is an integral part of the Army, which, to work efficiently, must know Army technique, be loyal to the Army, and be thoroughly trained in military matters. The prime object of a separate department, if one is ever created, should be to destroy hostile cities. It cannot, without ruining the naval and military establishments, butt in upon their rôles and usurp any of their functions.

Another point which is worth considering is the constitutionality of a separate corps. I am not a constitutional lawyer, but clause 1, section 2, of the Constitution, defining the powers and duties of the President, states in part, "The President shall be commander-in-chief of the Army and Navy of the United States, and of the militia of the several states, when called into actual service of the United States." I have heard some pretty good constitutional lawyers state that a separate air department cannot be set up, because of its clause, without amending the Constitution. The grounds advanced by them was that the President is charged with the defense of the land and the sea, and that, by omission, it is not within his power to take charge of the defense of the air.

Separate Corps.—I have given above the fundamental reasons upon which the justification for a separate corps have been based. Delays in correspondence and slow coordination will not be eliminated by the creation of a separate corps. Bureaucracy, already developing in the air service, will occasion in a separate corps just as many delays as there existed in the past.

Separate Promotion.—I have not found any antagonism on the part of nonflying Army officers toward a separate promotion list for air service officers. In the last analysis it is up to the air service to convince Congress of the wisdom of separate promotion. No one will probably benefit more relatively by a separate promotion list than I, as I have had more continuous active service in aviation in the Army than any other one officer, except one. Notwithstanding this, I cannot see the wisdom of separate promotion in light of its ultimate ruinous effect upon the morale of air service officers. The single list of the Army was evolved through long troubles the Army had had with fratricidal strifes between branches for promotion. Jealousies were rife. One branch did not hesitate to knife another in its efforts to lobby through Congress favorable legislation that would give them special consideration. The single list has stopped all this, with the result that the Army is more homogeneous than it has ever been, and interbranch jealousies have practically ceased. Under the single list, whatever one branch does to help itself will now help the whole Army. The result has been that the Army is now working to a common purpose and learning the vital lesson of teamwork. Through the medium of its schools, all services are learning the great lesson of cooperation and mutual understanding.

The air service will advance backward if it throws the single list overboard in their overanxious idea to exploit the opportunities offered them through this committee to advance aviation, and, incidentally, advance themselves. They are "putting themselves out on a limb," and instead of promoting aviation by making it possible to educate the Army to their peculiar problems and get some of their own officers in high administrative positions, they are isolating themselves into a special favored caste that will destroy unity of action and mutual understanding between them and the rest of the military establishment. Their separate promotion plans have not matured sufficiently, as has been evidenced by their testimony before this committee, to visualize to them the bitter partisan strifes that will eventually arise through the efforts, on the part of *passe* fliers, to keep from being forcibly retired at an age long before their value for useful careers has passed, and at an age too young to be retired with sufficient pay to support their families, but too old to put up a winning fight in civilian life. Bitter fights will take place for nonflying and administrative berths. Instead of developing independent spirits, it wll place a premium upon servility and sycophancy. A high morale cannot exist in any organization where juniors realize such conditions prevail, and live in fear of being eliminated in their very prime with the stigma placed upon them of being no longer good enough to hold down a worth-while job in the air service.

The very things that will better educate the Army to the peculiar problems of the air service, promote aviation within the Army, and place air

service officers in high administrative positions in the War Department, are the very things necessary to advance the art of military aviation. If the air service is to lend valuable service to the Army, its officers have got to know thoroughly the technique of other arms, understand their problems through intimate association, and work with them harmoniously. Similarly, other officers of the Army have got to be more familiar with the air service. The air service has got to learn the lesson of thorough cooperation. The various service schools, the school at Leavenworth, and the War College have taken a long step in this direction. To isolate the air service from the Army, creating thereby a special caste, will aggravate the present situation instead of helping it. It will make it more difficult than ever to bring about mutual education and common understanding. It will preclude instead of promote teamwork.

A little grammar school arithmetic will show where a separate corps or a separate promotion list will lead the air service and the terrific overhead that will result. The total flying in the six years from July 1, 1919, to June 30, 1925, was approximately 516,000 hours. The authorized heavier-than-air flying personnel of the air service is 723. This makes the average flying per man 119 hours. No man has served with active flying organizations long enough to establish definitely the length of their active flying service. It is safe to assume, however, that no officer's value as an active flier in a tactical organiation can exceed fifteen years. Therefore, the active flying life of an officer will only be fifteen times 119, or 1,785 hours. Now the average heavier-than-air fatality during this period of six years was one death in approximately every 3,240 hours. Therefore, within fifteen years, 55 per cent of the fliers will have been killed, and 45 per cent of the authorized strength of 723, or 326, will be left to be taken care of by being placed in nonflying or administrative jobs or by retirement. Now if the authorized organizations were filled up, there should be in the air service in tactical organizations only, approximately 1,160 flying officers and 75 nonflying officers. Therefore, under full strength operation, instead of but 326 officers to be taken care of, 38.6 per cent more, or a total of 523, would have to be provided for. Our experience has shown that officers cannot be expected to fly continuously for these fifteen years. They require a rest of not less than one year in five; therefore 20 per cent of the 1,160 would have to be taken off periodically and placed upon nonflying or administrative work. Therefore the total of 523 would have to be increased by 232, or a total of 755 officers would have to be taken care of.

Now at present in the air service we have but 221 nonflying, administrative, or school positions away from tactical organizations. Hence in every fifteen years, under the present authorized strength, we would have a surplus overhead of 534 officers to be disposed of by retirement at an average age of approximately forty years or less. In other words, 46 per cent of the organization flying personnel will have to be retired. If the Lassiter committee project, with its 4,000 officers, were adopted, then instead of 534, 1,840 would be surplus every fifteen years. From this it is apparent that the government would have to support upon retirement a great number of relatively young officers. I am sure the temper of the country will not stand for this.

Separate Budget.—As for a separate budget, it is my fixed opinion that a separate budget should be given all the services. A separate corps is not necessary to give the air service a separate budget.

Remedies.—My suggestions for remedying the present condition of our Army air service are as follows:

First. Give it a separate budget.

Second. Establish special qualifications in addition to military requirements for all air service officers and follow this up with periodic qualification tests so as to eliminate "dead wood" so that none but active qualified fliers

would command tactical units, and so that the most proficient who have lost their value as active fliers can fill the nonflying and administrative jobs.

Third. Create a special promotion list for air serice officers which operates only while they are assigned to the air service. Allow them to maintain their places on the Army lineal list, so that if transferred back to to the Army they will revert to their proper places. In order to eliminate the tremendous overhead that will result and the burden it will place upon retirement, or upon the other branches of the Army to absorb this overhead, adopt the policy of utilizing mechanic pilots and observers whose normal service would not exceed five years, and thereby open up a tremendous source of supply for fliers and place a premium upon the mechanics themselves for acquiring professional proficiency.

Fourth. Provide a machinery for the elimination of incompetents and under no conditions promote by selection. This machinery should make it possible for any organization commander to suspend from duty immediately, and immediately remove from his organization any personnel which is incompetent or is not working harmoniously with the rest of the organization.

Fifth. Educate the air service personnel more thoroughly in military subjects and in a true appreciation of the need for cooperation and teamwork with the rest of the Army.

Sixth. Put the air service to work developing proficient personnel, thoroughly trained and equipped tactical organizations, and stop the relatively useless jazz flying being engaged in.

Seventh. Revise the air service regulations so as to permit of greater specialization.

Eighth. Revise the Army paper work system so as to eliminate the great burden and irritation of paper work upon the operating personnel.

Ninth. Introduce a simple cost accounting system so that results can be gauged in dollars and cents, and so that Congress and the nation can be furnished a strict accounting of all funds appropriated.

Tenth. Pass special legislation giving the junior officers who came in during the war constructive commissioned service for time served as cadets.

Eleventh. Allow only field officers to be on duty in Washington or in places of high administration.

Twelfth. Concentrate all the air service units into three major stations, one on the East Coast, one in the center of the United States, and one on the West Coast.

Thirteenth. And, finally, settle once for all this aviation agitation, and thereby eliminate its ruinous effect upon the morale of the air service and its injury to discipline.

Conclusion. In conclusion, I would state that there is vital need for differentiation between personal advancement, advancement of military aviation, and advancement of air power.

Discount the excess enthusiasm for individualism and desire for the creation of a caste system, and to realize the vitalness of mass action or teamwork.

Organize a provisional air force, free from all other bureaus, to determine the possibilities of air power for international peace, which force shall restrict its operations entirely to a realm outside of those of the military and naval establishments.

Finally, if the precedent established by this committee proves of value to the air service, to the Army, and hence to the country, would it not be advisable to continue this precedent by the periodic appointment of presidential committees composed of representatives and disinterested Americans to investigate all the government bureaus impartially by examining witnesses, as this committee has, taken from a cross section of the various bureaus?

CURRENT PROFESSIONAL NOTES AND PAPERS

"The Lessons of Six Years' Experience in Commercial Air Transport (British)." *Aviation*, December 14, *et seq.*

"The Port of Wilmington, North Carolina." *The Nautical Gazette*, December 19.

"Stresses in Boilers." *The Engineer*, December 4.

"Aviation Engine Performances." *The Journal of the Franklin Institute*, December.

"The Motor Liner *Gripsholm.*" (A complete description.) *The Engineer*, November 27, *et seq.*

"Designing Engines into Airplanes." *Aviation*, November 30.

"Industrial Cooperation with the War Department." *Mechanial Engineering*, January, 1926.

Eleventh Annual Report of the National Advisory Committee for Aeronautics, 1925.

NOTES ON INTERNATIONAL AFFAIRS

FROM DECEMBER 3 TO JANUARY 3

PREPARED BY PROFESSOR ALLAN WESTCOTT, U. S. Naval Academy

PLANS FOR ARMS CONFERENCE

UNITED STATES INVITED TO PRELIMINARY ARMS CONFERENCE.—At the session of the League of Nations Council in December it was decided that, prior to the projected general disarmament conference, there should be a preliminary meeting at Geneva on February 15, to draw plans and determine the scope of the conference. To this preliminary meeting the United States, Germany, and Russia were invited to send delegates.

President Coolidge, upon consultation with Senator Borah and other leaders, found them favorable toward American respesentation in the first conference, especially as it would afford a means of indicating the terms upon which the United States would enter into any general scheme of armament limitation. The following conditions were suggested: first, that the United States would not enter into any security compacts arranged at such a conference; second, that no agreement reached should be enforced by the League, but that each nation should be controlled simply by its own pledge; third, that no agreement should provide for reduction of United States land armament—in other words, the United States would agree to consider only naval limitations, and measures, such as prohibition of poison gas, and so forth, not affecting the size of armies.

AGENDA OF PRELIMINARY CONFERENCE.—From *Time*, 14 December, 1925.—The agenda of the proposed Special Disarmament Committee was embodied by M. Benes of Czechoslovakia into a long and complicated technical program, which provides that the following factors bearing on disarmament shall be considered:

1. "Visible Armaments": the actual armies, navies, and air forces possessed by the various nations.

2. "Invisible Armaments": the population, geographical situation, industrial strength, and war mobilizing power of the nations. Under this head special attention will be given to the possession by a nation of large fleets of commercial aircraft or chemical factories instantly convertible to war purposes.

3. "Degree of Security"; the relative security of nations under international agreements such as the Locarno Pacts and the Covenant of the League of Nations.

Observers noted that the chief conflicts over this agenda centered about the well-worn subject of "security." Viscount Cecil for Britain steadily opposed the inclusion of the "Degrees of Security" or "Invisible Armaments" clauses in the agenda. To him and to the British press, disarmament was evidently a subject which had to do chiefly with scrapping tangible im-

plements of warfare. However, M. Paul-Boncour, in the name of France and the smaller nations, insisted that the "intangible" factors actually outweighed the "material" in importance.

PLANS FOR ECONOMIC CONFERENCE.—At the December League Council session it was decided to issue invitations to prominent economists to attend a League Preparatory Committee for the organization of a World Economic Conference with the broadest possible agenda.

GREAT BRITAIN

IRISH BOUNDARY AGREEMENT.—On December 3 the boundary trouble between the Irish Free State and Northern Ireland was settled by an agreement reached in London by President Cosgrave of the Free State, Premier Craig of Ulster, and Premier Baldwin of Great Britain. The terms were as follows: (1) The boundary between northern and southern Ireland to remain as it is, thus favoring Ulster since the Free State claimed three northern counties; (2) The Free State to be relieved of its share of the British war debt, amounting by various estimates to from $25,000,000, to $100,000,000 a year; (3) The Free State to settle claims for injury to life and property during the civil war in Ireland since January, 1919. One apparent virtue of the agreement is that future disputes between the two parts of Ireland may be settled without English intervention.

FRANCE

CABINET AGREEMENT ON FINANCE.—On December 29 the Briand cabinet at last gave unanimous approval to the financial measures proposed by Finance Minister Doumer. In view of certain changes made to placate the six radical socialist ministers, these latter agreed to stand solidly with their comrades in support of the measure before the Chamber. According to a government *communique,* M. Doumer planned to meet the nine billion franc budget requirement for the coming year by further economies in tax collection, a tax on exports, a tax on exchange operations, an increase in the price of tobacco, and an exceptional temporary tax on payments. In view of the increased direct taxation voted on December 4, no further increases in direct taxation were contemplated during the coming year. The agreement of the ministry was hailed as a victory for Premier Briand over the extreme Socialist wing of his supporters, preventing the fall of his cabinet and putting a brighter aspect on the French political and financial situation than has existed for some months.

The agreement followed a month of uncertainty during which the fall of the Briand Cabinet appeared imminent. Certain clauses of the emergency finance measure introduced early in December were passed by only six votes, and on December 15 M. Loucheur, Briand's first Finance Minister, was forced to resign after two weeks in office owing to the refusal of the Finance Committee of the Chamber to approve or introduce his proposals.

ITALY

ITALIAN EMPIRE PLANNED.—From *Baltimore Sun*, 20 December, 1925.—London, December 19 (Special Cable).—Premier Benito Mussolini, in accordance with an agreement with King Victor Emmanuel, intends to proclaim Italy an empire in the course of the coming year, the *Sunday Times* will say tomorrow. The newspaper declares that Mussolini will endeavor to reach an agreement with the Vatican on the Roman question at the same time.

It is stated that the idea of converting the Italian Kingdom into an empire is making great headway among court and Fascist circles, and that it may become a reality before many weeks elapse. Although Italian diplomatic circles observe a discreet silence on the subject, Mussolini's imperial scheme is being broached freely in Fascist political quarters and Fascist newspapers express the hope that the Fascist Government may restore the imperial glories of the Cæsars.

In political quarters here this report is received with great interest. It is remarked that now that Mussolini has ruthlessly crushed all opposition to his rule in Italy and made himself undisputed master in his own house, the time is becoming ripe for pursuit of any foreign adventure he may care to embark on.

A dispatch from Angora that Mussolini plans the construction of a modern naval base on the Island of Rhodes, with an eye to extension of the Italian sphere of influence in Asia Minor, is provoking comment among diplomats here. The report also says that all available land on the coast of Turkey near Adalia is being bought up by the Italian Government through its embassy.

Such reports have been circulated here frequently from Greek sources, but have been discredited because of the well-known Greek suspicion of Italy. Of course, it is no secret that Mussolini has long cherished ambition to increase Italian power in the Mediterranean and Italy's possession of the Ægean and Dodocanese islands gives him excellent jumping-off places.

In connection with these reports, Mussolini's speech at Milan on October 28 is being recalled. He then told the Fascist troops: "Legionnaires, I give you rendezvous for next year. Only the place is unknown. But I am as certain as I am certain of truths in mathematics that next year you will all answer the call."

COMPULSORY ARBITRATION BILL PASSED.—The Italian Parliament adjourned on December 19 after a month's session during which more significant legislation was passed than by any law-making body of modern times in so short a period. Bills were passed protecting the government against Italian opponents abroad, greatly increasing the power of the Premier, and transferring a large part of local government to the central authorities.

Furthermore, on December 11, a law was enacted providing for compulsory arbitration of all labor disputes, whether agricultural or industrial. Only the Fascist labor unions and Fascist employers' organizations will be recognized by the government, and these will have full power to settle disputes.

Rome, December 11 (AP).—Premier Mussolini, closing the debate in the Chamber of Deputies on the Government's labor bill, today declared that the bill might be considered a war measure, "because I consider the Italian nation in a permament state of war."

"Even as controversies are not permitted at the front in wartime, so now we must realize the maximum national efficiency," he added.

The Premier said that the law, according to which the government will recognize only the Fascist labor union and the Fascist employers' organization as competent to deal with disputes between capital and labor, was intended as a preventive of strikes and lockouts, which had dissipated the surplus energy of the nation.

The Premier said he did not believe that the special compulsory courts for labor disputes to be established by the law would be used much. The very fact that both labor and capital would know that they must settle their disputes without strikes and lockouts would be enough to make them settle them out of court.

RUSSIA

FURTHER CONCESSION TO PEASANTS.—On December 25 the All-Russian Congress of the Communist Party adopted by a vote of 556 to 65 the platform recommended by the majority of the Central Executive Committee. This was a decided victory for those leaders who have advocated further concessions to the peasants and soft pedaling of the dogma of a proletarian revolution, so far as it conflicted with the interests of the peasantry. Stalin was the most conspicuous among these majority leaders. The action of the party indicates that Russia has gone a step further on the way toward peasant control.

The platform advocated cooperation with the middle class peasants, strengthening of all military forces, and industrialization of Russia to the extent of making her independent of other nations in supply of heavy machinery. It warned against American control in international affairs, amounting to "financial and economic world domination," and while instructing the Executive Committee to follow a peaceful foreign policy, it called for consolidation of the Soviet Republic by every means as the basis of a future world revolution of the western proletariat and oppressed colonial peoples.

TURKEY AND NEAR EAST

LEAGUE COUNCIL DECISION ON MOSUL.—On December 16 the League Council rendered its final decision in the Mosul dispute between Great Britain and Turkey. Mosul and the Mosul villayet, including the oil fields, were granted to Irak on condition that Great Britain continue her protectorate over Irak for the next twenty-five years and negotiate a commercial treaty between Turkey and Irak allowing Turkey to use the trans-Irak trade routes. Aside from slight concessions to Turkey, the "Brussels line" tentatively established last year was taken as the frontier. A week later the British House of Commons approved the government policy of accepting the Irak protectorate, although the Labor members left the Chamber in protest.

The Turkish delegates at Genoa refused to be present at the announcement of the Council's decision. In a subsequent statement on January 1, the Angora Government, while admitting its inability to contest the decision at once, reiterated its claims to the disputed territory and served formal notice that these would be revived at a favorable opportunity. Offers by the British Government for direct negotiations were not accepted.

TURKISH ATROCITIES.—The report of the League Commission sent to investigate alleged Turkish mistreatment of Christians in the Mosul area was made public on December 15. The report declared that wholesale deportation of Christians had occurred last spring, during which many Christian villages, inhabited by Chaldeans who had lived for centuries in the region, had been subjected to pillage and massacre. The report was based on the statements of three thousand Christians who had escaped from the deportation column and were living in poverty in Irak.

RUSSO-TURKISH TREATY.—From article by Edwin L. James, *New York Times*, 24 December, 1925.—Paris, December 23.—The treaty of friendship and mutual benevolent neutrality just announced as having been signed by Russia and Turkey reminds one a good deal of the treaty of Rapallo. Both times it was somewhat the case of misery loving company.

It will be recalled that while Lloyd George had the nations of Europe at Genoa planning the return of Europe to normal conditions, the Russians tried to get a loan and the Germans tried to get a revision of reparations before they would join the British Prime Minister's round-robin promise to be good. Both failed, and one bright Sunday they went down the Mediterranean coast to a pretty little resort and signed a treaty bargain appearing to pool their political and material interests, which at the time was taken so seriously as to cause Lloyd George to make a speech about the danger of "a hungry Russia armed by an angry Germany."

Now, two and a half years later, Russia sees other European nations bind themselves together by the Locarno treaties, and Turkey sees the League of Nations decide against her claim to Mosul. Just as did the Russians and Germans in 1922, the Russians and Turks now feel a community of soreness against the rest and make themselves a private treaty.

There is no doubt about what is behind the new treaty. The Turkish governmental press has made plain that it is the answer of Russia and Turkey to Locarno and Geneva, and M. Techitcherin substantiated that by issuing a new attack on the League of Nations before he left Berlin for Moscow. Doubtless, the Turks figure they have arranged for help against England if the time comes when help is needed, and, doubtless, the Russians think they have kept Turkey out of the League of Nations. That is what they thought they had done with Germany, but they were wrong.

Despite Article II of the new treaty, which binds the two countries not to join any political grouping with interests against either, which is to say the League of Nations, it is a mighty good guess that Turkey will come in the League when she gets her price.

Of course the treaty has immense importance on the face of it. Any one who glances at the map will see the probability that if Turkey chases the British forces out of Mosul, which the Turks can do as matters stand, England would take Constantinople. And for generations England wanted Constantinople, not so much because it was a pleasant city as because it controlled Russia's Black Sea outlet. But in diplomatic circles in Paris the tendency is not to attach enormous importance to the treaty, it being contended that instead of pledging neutrality Russia and Turkey would have pledged each other active aid if they had really intended to make a firm partnership.

GREECE TO PAY BULGARIA.—At its December meeting the League Council accepted the recommendation of its investigating commission that Greece was to blame for the Greek-Bulgarian clash and should pay Bulgaria an indemnity of $219,000. It also ordered that two Swedish officers should be named as arbitrators to decide border disputes between the two countries.

UNITED STATES AND LATIN AMERICA

UNITED STATES AND THE WORLD COURT.—In his message at the opening of Congress in December, President Coolidge again advocated that the United States should join the World Court, arguing that such a court could not be one "that we have set up alone or which reflects only our ideals," and that "we shall not find ourselves bearing a disproportionate share of the world's burdens by our adherence, and we may as well remember that there is absolutely no escape for our country from bearing its share of the world's burdens in any case."

Among the chief opponents of such action, in subsequent debate in the Senate, was Senator Borah, chairman of the Foreign Affairs Committee. It was estimated, however, that if the question were brought to a vote the opposition would be reduced to about twelve.

PAYMENT OF CLAIMS AGAINST GERMANY.—American private claims against Germany for war losses, according to decisions of the American-German Mixed Claims Commission, amount to nearly $180,000,000. Secretary Mellon proposed that for settlement of these claims Germany issue twenty-five-year bonds at 5 per cent, guaranteed by the United States. The objection to an American guarantee was met by the answer that without this guarantee the bonds would have little value, and that settlement otherwise would involve at least a long delay. German private property in the United States, amounting to $300,000,000, now in the hands of the Alien Property Custodian, will be returned to the owners.

JUGO-SLAV DEBT MISSION.—Jugoslavia in December notified the United States that a debt mission would be sent to Washington early in 1926. The Jugoslav debt amounts to about $50,000,000, plus $15,600,000 interest, in payment of which it was expected that at least as favorable terms as those granted to Italy would be requested.

TACNA-ARICA PLEBISCITE DATE SET.—The Tacna-Arica Plebiscite Commission on December 9 approved a motion setting January 15, 1926, for the presentation of an election law, February 15-March 15 for registration, and April 15 for the plebescite. Chili, after protesting at the delay in setting a date, objected to the date set as needlessly postponed. It was expected that an appeal would be made to President Coolidge.

FAR EAST

LEADERS SUPPRESS REVOLTS.—By the close of December General Feng Yu-Hsiang, so called "Christian" leader in control in Central China, had, after severe fighting, recaptured Tientsin and overcome the forces under the former governor of Chihli province. At the same time Chang Tso-lin had succeeded in suppressing the revolt led by his chief lieutenant in Manchuria. Thus affairs in China returned to their former status, but it was doubted whether the two super-tuchuns, after putting down the revolts in their own ranks, would be ready to enter upon hostilities against each other.

EXTRATERRITORIALITY CONFERENCE POSTPONED.—Owing to disturbed conditions in China, the Conference on Extraterritoriality, which was to have met at Peking on December 18, was indefinitely postponed.

The tariff conference in December adopted resolutions providing for Chinese tariff autonomy and fixed the date January 1, 1929 for putting the new tariff into effect. In return the Chinese Government pledged itself to abolish the *likin*, or interprovincial duties, by the same date.

On November 3 the American plan was laid before the conference. This plan, while agreeing to recognize China's tariff autonomy three years hence, included a number of conditions unacceptable to China. In the first place, it made tariff autonomy contingent upon the abolition of *likin*. True, at the meeting of November 17 this condition was modified so as to save China's face, China declaring of her own accord to abolish *likin* before January, 1929.

But the features of the American plan to which China objected strenuously still remain to be adjusted. The most serious of these features is the provision that increased tariff revenues shall not be handed to the Chinese Government, but shall be held by the customs administration under foreign control to be allocated to (1) the compensation of the provincial authorities for their loss of revenue by the abolition of *likin*, (2) the payment of rebate charges for *likin* dues illegally collected after *likin* is abolished, (3) the refunding of unsecured debts and (4) administrative expenses of the central government. The American plan further provides that in May, 1928, the powers shall hold another conference at Peking to determine whether China has abolished *likin* to an extent to justify the restoration of tariff autonomy.

Baltimore Sun, 3 December

PERSIA

PERSIA'S NEW DICTATOR.—From *Current History* for December, 1925.—By resolutions adopted by the Persian Mejliss, or National Assembly, on October 31, deposing the Kajar dynasty "for the sake of the national welfare" and entrusting the government and the national laws provisionally to the Premier, Riza Kahn, one of the most striking political personalities of the Far East, reached supreme power in Persia, in name, as well as in fact. For Riza Kahn had been officially master of Persia's destinies since October, 1923, when he became Prime Minister, and even for several months before that, while he acted as Minister of War. The Shah, Ahmad, seventh of the Kajar dynasty (acceded to the throne in 1909, at the age of thirteen) left Teheran at the end of 1923 and has since resided in Paris. He has repeatedly declined to return. The act of the Mejliss completed the similar attempt made in March, 1924, and frustrated only temporarily by a demonstration led by the mullahs (priests) and nobles.

By this bloodless revolution, the premier, Riza Khan, became supreme arbiter of the destinies of Persia. The resolution stated that it was left to the National Assembly to decide on a permanent form of government. Whatever may occur in the future, Riza Kahn, like Mussolini in Italy, or Primo de Rivera in Spain, to say nothing of Mustafa Kemal Pasha in Turkey, stands out today as one of the big and even dominating personalities of the modern world; and his phenomenal career and personality deserve consideration.

Riza Khan is perhaps the strongest man that Persia has produced during the last half century. Born of lower middle class parents in the Province of Mazanderan in 1877, he has come to the top like Chengiz Khan, Tamer-

lane, and scores of other great men of history by sheer talent and force of character. He is practical, diplomatic, and iron-willed, and has no use for mere words and theories. He joined the Persian Army as a private at the age of sixteen, and two years ago, at the age of forty-six, he became the Sardar Sipah, that is, commander-in-chief. He has made and unmade prime ministers, and now he has unmade the Shah. He is the Man of Destiny for whom his country has long been waiting to put her house in order and lead her along the road to freedom and progress.

Riza Khan received his military training in Russia, and is reported as pro-Russian in his sympathies.

BOOK REVIEWS

BOOK DEPARTMENT

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SELECTIONS FROM THE CORRESPONDENCE OF THEODORE ROOSEVELT AND HENRY CABOT LODGE. New York. Scribner's, 2 Vols. $10.

Already there has been published an autobiography, an authorized biography, and various family letters of Theodore Roosevelt. There are other books on Roosevelt by authors who accent one part or another of the character of this great American. The future will doubtless yield more and more books on Roosevelt until a library comparable to that on Lincoln is published. But it is doubtful if any book, past or future, will reveal as much of the man Roosevelt, acting in his public capacity, as his own letters written from day to day throughout his public life to his intimate counselor and friend, Henry Cabot Lodge.

No life of Lodge has yet appeared. There is in press his account of the fight he led against the League of Nations. But Lodge played too large a part in our public and literary life to long lack a biographer. The catholicity of Roosevelt's taste, his wide circle of friends, and his willingness to listen have caused many to believe they influenced his decisions. Roosevelt himself, in 1908, about a year before leaving the White House, said "For the past twenty-four years, I have discussed almost every move I have made in politics with him (Lodge), provided he was at hand and it was possible for me to discuss it; and as regards many matters of policy and appointment it would be quite impossible for me now to say whether it was he or I who first suggested the appointments I made or the course that I followed." The letters published abundantly prove that Roosevelt's statement was no friendly exaggeration of his esteem and respect for Lodge.

Roosevelt's strength of character is too well known to account for this statement on any other ground than the extraordinarily sympathetic understanding that existed between these two eminent Americans on almost all political and literary questions. They were both writers, fond of outdoor life, devoted to history and "useless information"; both were of Harvard and the Porcellian Club; both were practical men with equal contempt for

reformers too lily white to take part in vulgar everyday politics; both knew western Europe at first hand and had the same aversion for the American anglomaniacs who apologized in London for the Declaration of Independence as for the Irish and German Americans who brought their European quarrels to the United States; both believed in the United States, its future greatness, and had no mind to merge its destinies with other countries; both knew enough of world affairs to realize that the United States would get just the consideration from the other world powers, singly or in concert, that her armed strength justified. And being advocates of the United States playing a worthy part in world affairs, they both, throughout their lives, supported a large navy.

Roosevelt was always identified with the executive branch of the Government, Lodge with the legislative, and they made a formidable team in defense of the Navy at a time when such a defense was sorely needed. Therefore, naval officers would do well to read these letters which reveal the interest these two men took in naval affairs and to note the strides the Navy took in the period 1897-1909, due partly to the Spanish War, but, when the effect of that war had worn off, more largely to the efforts of these two men. In 1897 the United States was fifth in the navies of the world. In 1909 it was second. This is no coincidence, but, as shown in these letters, largely through the persistent and continuous efforts of these two men. When Roosevelt departed the White House interest in the Navy lagged, and, by 1914, the Navy had dropped to a bad third.

The letters commenced in the year 1884 when Lodge and Roosevelt were working for Reed against Blaine for the Republican presidential nomination. At this juncture, and until 1898, Lodge was much higher in the political firmament than Roosevelt, and he was coaching Roosevelt in political matters almost like an older brother. It may encourage beginners in politics to recall that in 1892 Roosevelt was not sure he could be elected a delegate to the Republican National Convention, while in 1908 he dictated the nominee for President to the Republican National Convention.

Most of the letters in the period 1884 to 1889 are taken up with literary matters, for the two scholar-statesmen were engaged in producing biographies of various American statesmen and other literary work. During this period Lodge produced his *Life of Washington* and Roosevelt *The War of 1812* and the first volumes of The *Winning of the West*.

As early as 1888, Roosevelt, a private citizen in a minority report to the Union League Club, advocated "the employment of part of the surplus (of revenue) in building a Navy and providing adequate coast defense." In the same year in another speech he states, "It is a disgrace to us as a nation that we have no warships worthy of the name and that our rich seaboard cities should lie at the mercy of any piratical descent from a hostile power. We are actually at the mercy of a tenth-rate country like . . . . Now we have ample means to prepare a Navy forthwith. . . . . He is both a poor patriot and a short sighted economist who longer opposes our doing so."

In 1886 Lodge was elected to the House of Representatives where he served until 1893, when he was sent to the Senate where he remained until his death in 1924. In 1889, largely through the efforts of Lodge, Roosevelt was appointed a member of the Civil Service Commission, an institution recently established to increase the efficiency of the civil service. At first the commission received little support from the President and Postmaster General; in consequence Roosevelt had various rows on his hands, but he appeared to enjoy the work and thought he had benefited the country and the Republican Party by his actions. The letters of this period are mostly of party politics and are of little interest to naval officers, except as displaying the fighting spirit of Theodore Roosevelt. These letters have been collected by Lodge who has modestly inserted many more letters from Roosevelt than from himself, although at this time Lodge enjoyed a higher position in public life than Roosevelt. Fortunately it is possible in most cases to infer from Roosevelt's letters the substance of Lodge's letters. An amusing postscript to one of Roosevelt's letters asked Lodge's confirmation of a rumor that John L. Sullivan, ex-champion pugilist, would run for Congress. And, in 1891, Roosevelt was very anxious to know the result the redistricting (gerrymandering) in Massachusetts would have on Lodge's congressional district. In October, 1894, Roosevelt writes Lodge, "I do wish our Republicans would go in avowedly to annex Hawaii and build an oceanic canal with the money of Uncle Sam." This remark was occasioned by Cleveland's repeated refusals to accept Hawaii. In the same letter he paid his respects to one Edward Atkinson, who had been indulging in a little abuse of the Regular Army in the cowardly assurance that regular officers could not reply to him.

In 1895 Roosevelt left the Civil Service Commission and went to New York City as one of the three police commissioners. He immediately writes Lodge, "You need not have the slightest fear about my losing interest in national politics," and he gives evidence of the truth of this statement in the letter of February 25, 1896: "The only thing outside of my present work in which I take a real interest is the question of our attitude towards foreign powers and, therefore, of our defense. What has been done in the Navy? Surely Tom Reed cannot be going to try to throw us down on a question of an addition to the naval forces and proper preparation for coast defense." Lodge's interest in the Navy is indicated by a prompt reply on February 27, as follows: "We are going to get a good appropriation for the Navy. The subcommittee has voted Boutelle down, who wanted to reduce the number of battleships from six to four, and whatever comes over we shall probably add to it in the Senate. Even four would be the biggest authorization we have ever made, so you see there is no danger of the Navy being crippled." Again, on March 13, Roosevelt wrote, "More important than any other question is, it seems to me, the matter of providing an adequate coast defense and an adequate Navy."

On April 29, 1896, Roosevelt and Lodge were attacked by President Eliot as "degenerated sons of Harvard." Roosevelt's retort was as follows:

"It is a fine alliance, that between the anglo-maniac mugwumps, the socialist working men, and corrupt politicians to prevent the increase of our Navy and coast defenses. The moneyed and semi-cultivated classes especially of the Northeast, are doing their best to bring this country down to the Chinese level, ... there is nothing that provokes me more than the unintelligent, cowardly chatter for 'peace at any price' in which all these gentlemen indulge." On May 2, 1896, Roosevelt writes, "I have absolutely no patience with men who are willing to vote to recognize Cuba and to approve of protecting Venezuela, but who are not willing to provide the means to make our action effective. I think I hate nothing more than a bluff where the bluffer does not intend to make it good." These remarks were aimed at people in Congress who were voting to recognize Cuba and to protect Venezuela and at the same time voting against an Army and a Navy. Unfortunately, this type perseveres to this day and men in Congress in the past few years have spoken in favor of restricting Japanese immigration and of reducing the Navy on the same day.

In early April, 1897, through the persistent efforts of Lodge, Roosevelt was appointed Assistant Secretary of the Navy and acknowledged his appreciation in a telegram dated April 6, "Sinbad has evidently landed the old man of the sea." Roosevelt's efforts to improve the efficiency of the Navy, particularly the efficiency of the fleet, have been abundantly recognized. His position as assistant secretary was delicate as his interest in the Navy exceeded that of Secretary Long, and Lodge, still acting as his political mentor, occasionally cautioned him against appearing to dictate the policy of the Navy Department. In August, 1897, Roosevelt got a "wigging" from the Secretary of the Navy for a speech he made to the Naval Reserves of Ohio in which he said, "that the United States should decide whether or not it will annex Hawaii wholly without regard to the attitude of Japan or any other power." This remark was occasioned by the protest Japan lodged against our annexation of Hawaii; this protest has never been withdrawn and is still the official attitude of the Japanese Government towards our occupation of the Hawaiian Islands. On August 8, 1897, Roosevelt wrote, "I have the armor board at work, and the cruising squadron of battleships and torpedo boats under my eye. With the docks I have nothing to do; I believe we need a radical revision of our whole dock system." Knowing Roosevelt's interest in all matters naval, I am safe in the prediction that he would have been glad to take over the docks as well as the fleet.

Lodge about that time was doing his best to bring about the annexation of Hawaii and paid his respects to Moorefield Storey as follows: "Our friend, Moorefield Storey, has been making a speech in which he has denounced the annexation of Hawaii; the reason being that because we cannot govern New York and Boston with perfect success we ought not to undertake anything else. I simply mention this to show you the direction which our best thought is taking."

During the month of September, 1897, Roosevelt wrote "He (President McKinley) is evidently by no means sure that we shall not have trouble with

either Spain or Japan; and, though he wants to avoid both, yet I think he could be depended upon to deal thoroughly and well with any difficulty that arises. I told him that I thought we ought to have some warning in the Navy Department, and that we ought not to be kept ready all the time . . . . that I would guarantee that the Department would be in the best possible shape that our means would permit when war began; and that, as he knew, I myself would go to the war. He asked me what Mrs. Roosevelt would think of it, and I said that both you and she would regret it, but that this was one case where I would consult neither. He laughed, and said that he would do all he could, and thought he could guarantee that I should have the opportunity I sought if war by any chance arose. To my great pleasure he also told me that he intended we should go on building up the Navy. . . . ." On a drive with President McKinley, Roosevelt gave him the positions of all the ships in the Navy and sketched an outline of the disposition he would recommend for them in war.

Contrary to contemporary opinion Roosevelt was genuinely fond of Long, the Secretary of the Navy, and writes Lodge in September, 1897, "Long is just a dear. . . . . He has wanted me to act entirely independently while he was away, and to decide all these things myself, even where I have written him that I was going to decide them in a way that I doubted whether he would altogether like. . . . . He is a man of whom one really becomes fond and I am looking forward to his return." This fondness did not prevent Roosevelt prodding Long in regard to keeping up the Navy and, on September 29, he wrote as follows: "I asked the Secretary's permission to day to talk to him very seriously about the need for an increase in the Navy. . . . . He listened . . . . and I half believe that I made some impression on him." The results of his efforts on Long he gave in a letter on November 5. "Now, in strict confidence, we have won as regards the principle of extension of the Navy with the Secretary; he will recommend one additional battleship, and additional torpedo boats. It is too little, but it is a recognition of the principle that we are not to stop. He carefully explained to me that he had always intended this; and that I must be careful not to give the impression that he was converted."

Roosevelt's record as a "rough-rider" is too well known to describe, but his letters give a vivid description of the chaotic condition in the War Department during the Spanish War which will interest any naval officer. As a result of his career in the war, Roosevelt was given the Republican nomination for governor of New York and was duly elected in the fall of 1899. Although immersed in the affairs of New York state, he did not forget his interest in the Navy and was continually looking forward to a national career for himself. He wished to be either Governor General of the Philippines or Secretary of War. The exigencies of Republican politics made him the nominee for Vice President of the United States. Lodge advised him to accept the nomination because he would likely become the logical candidate to succeed McKinley in 1904 and because Lodge feared the local political situation in New York with Platt as "boss" would discredit Roosevelt in the remainder of the United States, and he wished to get

Roosevelt out of the governorship of New York without impairing his national reputation.

The bullet of an assassin made Roosevelt President in 1901, he was elected President by an overwhelming majority in 1904, and throughout his administrations he followed his well-known saying of "speak softly but carry a big stick." In 1908 he sent the United States Fleet around the world and is accredited by many with preventing a war between Japan and the United States by this action. At no time during his administration was it safe to murder Americans abroad and yet he maintained the peace, proving his theory that "a just man armed" can go quietly about his own affairs. In 1903 Roosevelt appointed Lodge one of the American representatives on the Alaskan Boundary Tribunal, where Lodge very ably sustained the contention of the United States. Up to this point Lodge had been restraining Roosevelt, now Roosevelt found it necessary to restrain Lodge, who was vexed by the procrastination of the British members of the tribunal, and, on July 8, he wrote to Lodge as follows: "While, on the one hand I should peremptorily decline to let the case go over until next summer, on the other hand I should feel that it would be an act of petulance and folly on our part to break off the negotiations if the British simply requested ten or fifteen days extra, or even a month. We should at once be putting ourselves in the wrong if we adopted such an attitude." While careful to be courteous to the British, Roosevelt had already written Lodge as follows: "I dislike making any kind of threat but my judgment is that if the British play fast and loose the thing to do is to declare the negotiations off, recite our case in the message to Congress, and ask for an appropriation to run the boundary as we deem it should be run. . . . . The English behaved badly in Venezuela despite the fact that we had behaved with scrupulous impartiality during the Boer War. I don't intend that they shall do any shuffling now."

One of Roosevelt's great achievements was making peace between Russia and Japan and on May 15, 1905, he wrote Lodge as follows: " . . . . . it is evident that Japan is now anxious to have me try to make peace. Just as Russia suffered from cockiness and has good cause to rue her refusal to take my advice and make peace after Port Arthur fell, so Japan made an error in becoming overelated in turn after Mukden and then rejecting my advice to make peace." His efforts took a more direct turn in the early part of June when he sent the following dispatch to the American ambassador at St. Petersburg: "Ambassador Meyer will at once call on His Majesty, the Czar, and say that he does so by personal direction of the President to urge upon His Majesty the desirability of his consenting to the request of the President to have representatives of Russia meet with representatives of Japan to confer as to whether peace cannot now be made." After overcoming many obstacles Roosevelt succeeded in bringing these two nations to terms. In all probability he was the one person in the world who could have accomplished this task.

The West Coast was becoming increasingly opposed to Japanese immigration and in June, 1905, Roosevelt wrote concerning them, "These Pacific

Coast people wish . . . . to keep out the Japanese immigrants . . . ., and with besotted folly are indifferent to building up the Navy while provoking this formidable new power—a power jealous, sensitive, and warlike, and which, if irritated, could at once take both the Philippines and Hawaii from us if she obtained the upper hand on the seas. . . . . I hope that we can persuade our people, on the one hand, to act in a spirit of generous justice and genuine courtesy toward Japan, and, on the other hand, to keep the Navy respectable in numbers and more than respectable in the efficiency of its units. If we act thus we need not fear the Japanese. But if, as Brooks Adams says, we show ourselves 'opulent, aggressive, and unarmed,' the Japanese may some time work us an injury."

Roosevelt regarded the completion of the Panama Canal as his greatest contribution to the country. His manner of securing this territory has been severely criticized by the overrighteous and his political adversaries made the most of his method of cutting the "Gordian knot." As time goes on there will be fewer criticisms of his methods of dealing with an overreaching and not overscrupulous country.

It is doubtful if any contribution that Roosevelt made to his country in his public capacity equals that which he made in his private capacity in 1915. At that time, although Europe was ablaze with war, the American people had been lulled into a sense of security and had been persuaded that not only did preparation for war not prevent war, but made for war. Even naval officers succumbed to this sophism and one, at least, of rank said "that Europe was prepared for war, Europe is now at war, therefore, the way to avoid war is not to prepare for war." Any child could prove the falsity of this proposition, but it took Roosevelt, ably seconded by Lodge and his son-in-law, Congressman Gardner, to awaken this country to its perils and to its unarmed condition in 1915. So great was the opposition to preparedness in some quarters that it took a year of organized effort, led largely by Roosevelt, to get a bill through Congress to provide a proper Navy. This was Roosevelt's last contribution to the Navy. In 1916 he was already failing in health and only his remarkable will enabled him to carry on his many activities. He died in January, 1919, so no one can say positively what his attitude would have been on the questions which have since arisen, but it may be safely ventured that he would not have been far apart from Lodge who, through his life, was his confidant, counselor, and friend.

W. D. P.

AERONAUTICAL METEOROLOGY, By Willis Ray Gregg, A.B. The Ronald Press Company, New York, 1925. $2.50.

Reviewed by F. W. Reichelderfer, Lieutenant, U. S. Navy

Those who take an interest in the ways of the atmosphere will welcome this convenient volume which brings under one cover the main features of our present knowledge of aerology, the science of the upper air. Aviators, especially, have felt the need for a book on the aerological conditions of the United States with special reference to aviation. Heretofore, the publi-

cations devoted to this field have been limited largely to brief sections in the manuals of aviation training schools and scattered articles and pamphlets. The term, upper or free air, used in aerology refers to that part of the atmosphere which lies above the range of ordinary surface meteorological instruments. Observations of this region must be obtained largely by kites, balloons, and airplanes.

In addition to bringing together the latest aerological researches in this country, the book contains the main principles of general meteorology so that the reader may have a foundation for the aerological structure. Since the presentation is limited to "handbook" form, the author does not delve deeply into the details of the subject. He has given sufficient material to meet the needs of the average aviator. Most of the upper air statistics and summaries have been prepared from observations made by Weather Bureau aerological stations. Since the author has for a long period of years been in charge of the Aerological Division of the Weather Bureau, this material has been prepared largely under his direct supervision. Further testimonial as to its authoritativeness is afforded by the list of manuscript readers, in which the names of several prominent meteorologists appear.

The book opens with a few brief definitions, followed by chapters giving concise discussions of the general circulation of the atmosphere, the common meteorological and aerological instruments, and methods of observation. The vertical structure of the atmosphere is then taken up. This includes discussions of temperatures, humidities, and winds aloft. The fifth chapter gives the usual descriptions and photographs of cloud forms, including fog. There are also reprints of charts showing relative height frequency of the different cloud forms, as computed from observations at Blue Hill, Massachusetts, which are of interest in planning certain aviation operations, such as bombing. The charts are not, of course, applicable to all regions. In other chapters, weather elements of special importance to aviation—such as visibility and thunderstorms—are discussed briefly. The procedure of weather forecasting is outlined and a number of forecasting precepts are given, including some of the "local indications" found useful at naval air stations, and a few of the better founded weather proverbs. Other parts of the book cover briefly the subjects of cyclones, anti-cyclones, and flying conditions over the North Atlantic and in North Polar Regions. A very useful description of the distribution of weather advices by radio enables the aviator to determine what information is available, and a list, giving the headquarters of meteorological services of the world, tells him where he may seek more information. Near the back of the book, convenient conversion tables and a bibliography of many standard books and pamphlets on meteorology are given.

Probably the thing that most aviators will look for and fail to find in *Aeronautical Meteorology* is a definite and infallible answer to the question "What is the weather for tomorrow?" A few, simple, universal rules of thumb for determining the weather for the next twelve or twenty-four hours are much in demand among aviators. What a grand and glorious feeling for the forecaster if such rules were possible! A perusal of this

book should help the aviator better to understand that the weather is not made up of a few self-contained cyclones and anti-cyclones whose characteristics conform loosely to a few cut-and-dried rules, the latter marking the limit of possibilities in forecasting, but is the result of definite physical processes relatively simple in themselves yet difficult to forecast because of the fifty-seven varieties of variables influencing them. It should help him to recognize that weather is the product of conditions in the vast upper air, as well as of surface conditions, and that future development of detailed forecasts such as he desires lies probably in more observations of the upper air—observations which he may materially assist in obtaining.

Meteorology naturally developed through a study of average conditions. The classical work of Maury lies mostly in the field of oceanographical and meterological averages. But the average weather conditions represent a so-called normal which rarely if ever exists, and it is the departures from normal of our every-day weather which largely determine the activities of the aviator. Reliance upon weather averages may spell disaster to him. It is easy for the reader to lose sight of the fact that the averages or normals given in a textbook are not representative of the day-to-day conditions he will encounter, and it is a common mistake to put weather averages to uses for which they are not applicable. The author has wisely given tables of extremes and mentioned departures from normals in various parts of the book. It might be desirable for meteorological textbooks to place more emphasis on this point, although care must be taken to avoid confusing the student. Perhaps, in the present case, actual aerological conditions as distinguished from the average, might have been vividly shown by tracing briefly the influence of weather conditions on a few of the outstanding, long-distance flights, and describing the difficulties encountered. A few samples of this sort would help the reader to remember that weather averages are not a substitute for current weather forecasts in carrying out aviation activities on any particular day.

Aeronautical Meteorology presents a good opportunity for the aviator to become more familiar with the sea of air which he navigates. It is hoped that it will stimulate his assistance in solving the problems of aerological research which, in the end, will contribute materially to the efficiency of aviation.

JANE'S FIGHTING SHIPS, 1925. Edited by Oscar Parkes, O.B.E., M.B., Ch.B., and Francis E. McMurtrie, A.I.N.A. Sampson Low, Marston and Company, Ltd., London. Price in London, 42S.

In the "Foreword" to the 1925 edition of *Jane's Fighting Ships*, the publishers state that this is the twenty-ninth annual edition. This is an error, as this edition is really the twenty-eighth, the first edition having appeared in 1898. But when one considers the enormous mass of detail that these publications involve, it is not at all surprising that an occasional error slips in; and besides, whether twenty-eighth or twenty-ninth, the 1925

edition is up to the usual standard of excellence that has been maintained for so many years.

The new issue includes a greater amount of new material than has been found possible for some years past. Some of this new material, such as a complete list of British flotilla leader and destroyer pendant numbers, and an entirely new Japanese submarine table which shows for the first time the new numbering according to class, is of perhaps more interest than actual value; but these constant additions to the book serve to show the strenuous efforts made by the editors to include every bit of information that it is possible to gather. Much of the new matter is of great interest and value. Several sections are re-illustrated, many additional large size photographs, and many substitute pictures in cases where alterations have been made or better pictures obtained, are included.

In the section devoted to the United States Navy, chief interest attaches to the revised plan and sketch of the aircraft carrier *Saratoga*, which shows the new mounting of the eight-inch guns, amidships along the starboard topside.

The British section includes sketch plans of the *Nelson* and *Adventure*, together with many new or larger photographs of other ships. This section also contains particulars of trawlers, drifters, and so forth, which the editors say have been reinstated by request. But one notes with regret that absolute secrecy still surrounds the new *County* class—the 10,000-tonners—and that all details of these vessels are still withheld.

The Japanese section contains photographs of the altered *Mutsu*, and of the aircraft carrier *Hosho*, photographs of the new destroyer types, and a plan of the new cruisers.

The German section has been completely re-illustrated, and new plans of destroyers drawn to show the new arrangement of guns and tubes since reconstruction. Of special interest is the evident effort of the Germans to make the most of the ships at their disposal as shown by the additional seaworthiness given to the small cruisers and destroyers by alterations to the bows.

Other sections have been largely re-illustrated; and, generally, brought up to date in accordance with the latest information obtainable.

The publishers invite particular attention to the new form of silhouette proposed as a substitute for the now almost universally used block sketch. The publishers feel that recognition would be facilitated by sketches which show the features of a ship as well as the mass outline; and if the reception of the new silhouette warrants the change, it is proposed to substitute the new form for the old familiar black one.

R. S. R., Jr.

FINDINGS OF SHENANDOAH COURT OF INQUIRY

(From *New York Times*, January 2, 1926)

The court having thoroughly inquired into all the facts and circumstances connected with the loss of the U.S.S. *Shenandoah*, and having considered the evidence adduced, finds as follows:

I. *Matters entirely antecedent to the inception of last trip of Shenandoah but having a material bearing on this inquiry.*

FACTS

1. The design of the *Shenandoah* was begun under the cognizance of the Bureau of Construction and Repair in 1919. When the Bureau of Aeronautics was created and organized in 1921 all matters connected with the design and construction of the airship were transferred to that bureau.

2. At the request of the Bureau of Aeronautics, the National Advisory Committee on Aeronautics appointed a technical committee of five, composed of scientists and engineers of national reputation, to examine the design, methods, and assumptions used, as well as the actual design of the *Shenandoah*. This committee, after prolonged study, completely approved the design of the airship as prepared.

3. The airship was built at the United States Naval Air Station, Lakehurst, New Jersey, was completed in 1923, made its first flight on September 4, 1923, and was commissioned as the U.S.S. *Shenandoah* in October of the same year.

4. In the design of the *Shenandoah* approximately 4 per cent more of the total lift was assigned to the hull structure and fittings than in the design of certain foreign rigid airships for which comparative figures were available. As finally completed, the weight of the ship exceeded the designed weight by approximately 1 per cent.

5. The only major casualty suffered by the *Shenandoah* prior to the start of the Midwest flight occurred in January, 1924, when it was torn from the mooring mast at Lakehurst by stress of weather. The ship was thoroughly inspected and repaired after this accident.

6. Prior to the Midwest flight, the *Shenandoah* had cruised a total of approximately 740 hours in the air, covering approximately 25,835 statute ground miles, of which 605½ hours and 20,761 miles, including a transcontinental flight, was made subsequent to January 16, 1924.

7. A majority of the officers and crew had served in the *Shenandoah* continuously from the time of commissioning up to and including the Midwest flight of September 2, 1925. Many of these had received previous training on rigid airships abroad.

8. In accordance with the provisions of the National Defense Act of 1920, and upon recommendation of the Joint Army and Navy Board, approved by the Secretaries of War and Navy, the Navy was charged with the sole responsibility for the procurement and development of rigid airships for use over both land and water.

9. The U.S.S. *Los Angeles* was obtained through an international agreement that it should be used for commercial purposes only and was assigned to the Navy for operation. The Navy is charged with the development of rigid airships for commercial as well as for military purposes.

OPINIONS

1. The *Shenandoah* represented the best practices in design and construction at the period of its building.

2. The proportionately greater weight for structure and fittings of the *Shenandoah* resulted in increased strength.

3. The damage to the *Shenandoah* due to breaking away from the Lakehurst mooring mast was fully repaired and no loss of strength ensued as a result thereof.

4. The officers and crew of the *Shenandoah* were skilled and competent operators of rigid airships.

5. The operation of rigid airships over land, as well as over the sea, is a proper and powerful function of the Navy.

II. *Matters leading up to the flight of the Shenandoah beginning September 2, 1925.*

FACTS

10. The Navy Department had received 248 requests from public officers, public and semi-public bodies, and individuals for a flight of a rigid airship over the Middle West.

11. On June 7, 1925, in obedience to orders from the Navy Department, the *Los Angeles* started a flight to Minneapolis, but due to engine trouble returned to Lakehurst in accordance with the decision of the commanding officer after completing only the first part of the flight.

12. On June 9 the Chief of Naval Operations informed the commanding officer of the United States Naval Air Station, Lakehurst, and the commanding officer of the *Shenandoah* that that airship, which was then deflated, would be ordered to make the trip previously scheduled for the *Los Angeles* as soon as the former could be made ready, helium transferred, and the airship placed in active service.

13. In letter, dated June 15, the commanding officer of the *Shenandoah* recommended that such a flight be postponed until September on account of the probability of unfavorable weather conditions in the Midwest during July and August. Prior to the receipt of this letter the Chief of Naval Operations had issued orders, dated June 19, for a flight over the Midwest by the *Shenandoah* as soon as ready.

14. Upon its receipt the letter to the commanding officer of the *Shenandoah* of June 15 was considered by both the Chief of Naval Operations and the Chief of the Bureau of Aeronautics. As a result the commanding officer of the *Shenandoah* was ordered to Washington for consultation. On June 30 the consultation was held, at which the Chief of Naval Operations, the Chief of the Bureau of Aeronautics, the commanding officer of the *Shenandoah*, and the head of the Ships' Movement Division of Operations were present.

15. As a result of this conference, the orders of June 19 were revoked.

16. A mooring mast for rigid airships had been erected at Detroit, Michigan, by Henry Ford, and was completed about July 9. The Navy Department had been requested to send a rigid airship to Detroit to test this mast, the first to be erected in this country by private enterprise.

17. In letter dated July 20, the Chief of Naval Operations directed the commanding officer of the *Shenandoah* to submit an itinerary for a Midwest flight to pass over as many of certain specified cities as practicable on dates in the early part of September, when state and county fairs were scheduled to be held, and to test the mooring mast at Detroit.

18. In reply, dated August 4, the commanding officer of the *Shenandoah* recommended two separate flights, the first during the last week in August to Detroit to test the new mooring mast and the second beginning September 7 over the entire route covering the specified cities.

19. The Chief of Naval Operations after consultation with the Chief of the Bureau of Aeronautics, directed one flight only in lieu of two, this flight to begin September 2. The orders dated August 12 directed this flight.

OPINIONS

6. The commanding officer of the *Shenandoah* was fully consulted and given every opportunity to state his views in regard to the Midwest flight.

7. The commanding officer of the *Shenandoah* did not at any time express opposition to or any reluctance in undertaking the flight beginning September 2 on the ground of possible adverse weather conditions.

8. The object of the Midwest flight was threefold, viz.: to test the mooring mast at Detroit, to continue training of personnel, and to comply with many requests received from citizens of that section of the country that such a flight be made.

9. While recognizing the propriety and necessity of the legally constituted authorities in the naval service being the sole judges of the sufficiency of the reasons actuating all orders to naval craft, and further recognizing that the practice of ordering movements of naval vessels for the purpose of complying with public requests is in accord with long-established custom, it is considered that such movements should be limited to essentially naval and military operations insofar as possible especially in the case of new and experimental types.

III. *The condition of ship and crew at time of flight.*

FACTS

20. The ship was fully manned and equipped and in material readiness for flight.

21. Frequent and careful inspection of the entire structure of the ship had been made throughout its life. In addition, material similar to that in the structure of the ship had been kept under observation and been subjected to tests under instructions of the Chief of the Bureau of Aeronautics.

22. Extensive tests of material selected from widely separated parts of the structure after the wreck were made by the Bureau of Standards.

23. Both sets of tests have shown a limited deterioration of the material in the form of intercrystalline corrosion, which deterioration to the extent found does not affect in any substantial degree the ultimate tensile or compressive strength or the modulus of elasticity of the material but does largely reduce its ductility.

24. The design of the structure of the *Shenandoah* was based on ultimate failure of individual girders in compression. The design of these individual girders was such that under compression they would fail through flexure by instability. This failure would occur before the stress in the separate members of the girder had reached the elastic limit of the material and was, therefore, dependent upon the modulus of elasticity only, and not upon the ultimate strength of the material.

25. In letter, dated September 16, 1924, the commanding officer of the *Shenandoah* first proposed certain changes in the system of gas valves of that ship and subsequently renewed his recommendations in letters dated December 15, 1924, January 9, and May 12, 1925, and in telephone conversation of May 28, 1925. The commanding officer of the Naval Air Station, Lakehurst, concurred in this recommendation. Although the Bureau of Aeronautics at first questioned the advisability of this change, it finally approved it in letter of May 28, as an experimental installation, and in letter of June 13 transmitted to the commanding officer of the *Shenandoah* a design memorandum showing the effect of this change in reduction of the maximum safe rate of rise above pressure height of an airship so

equipped. This change, involving a reduction in number of automatic valves, was made in the latter part of May and early part of June. As a result, the *Shenandoah* was equipped with automatic valves in gas cells Nos. 4, 5, 8, 9, 12, 13, 16, and 17 and with maneuvering valves in gas cells Nos. 4, 6, 7, 10, 11, 14, 15, and 18. Subsequent to this change and prior to the Midwest flight, the *Shenandoah* had cruised about 186 hours, covering about 6,750 statute ground miles, not including Midwest flight.

26. Certain other changes, not contemplated in the original design, including removal of No. 6 engine, installation of water recovery apparatus, removal of manometers, due to the fact that no entirely satisfactory type has yet been developed, and other minor alterations, were made subsequent to the completion of the *Shenandoah*.

27. The *Shenandoah* was equipped with only two parachutes, which were carried for the purpose of landing personnel in order to make ground preparations in case it became necessary on any flight to make an emergency landing at a point where preparations had not previously been made.

28. The manual of the Bureau of Aeronautics required: "Parachutes—(a) Parachutes will be worn by all personnel in all types of aircraft when available. Specific exemptions may be made by commanding officers when their use increases the hazards of the personnel." The established practice at the Naval Air Station, Lakehurst, on both the *Shenandoah* and the *Los Angeles* was to carry only two parachutes.

29. The officers and crew of the *Shenandoah* were well organized, well trained, and highly skilled in performance of their duties.

Opinions

10. Deterioration of structural material was not a direct or indirect cause of the loss of the ship.

11. The deterioration shown to exist was not due to local causes but was generally distributed throughout the structure. It was not due to any lack of care or inspection in its manufacture and fabrication nor to neglect of proper measures for care and preservation in the ship after completion.

12. The court concurs in the opinions of expert witnesses that the rate of deterioration would not affect the safety of the structure of an airship for a much longer period than that covered by the life of the *Shenandoah*.

13. Material of this character will, until more thoroughly known and understood, require careful handling and observation during fabrication and while in service, but no evidence adduced before this court indicates that its use in the structure of rigid airships is unsafe or inadvisable.

14. The court concurs in the opinions of all qualified experts in the operation of rigid airships, who appeared before it, that the wearing of the present types of parachutes would add to the general risks and hazards of handling such ships due to their interference, especially in emergencies, with the quick and efficient performance of duty by the personnel. The court is, therefore, of the opinion that the judgment of the commanding officer in regard to carrying parachutes was sound. The present practice is adequately covered by the paragraph in the Manual of the Bureau of Aeronautics quoted in F-28.

15. None of the changes referred to in F-26 were contributory to the loss of the ship. The successful development of a thoroughly dependable type of manometer or gas pressure gauge giving accurate readings in the control car for each gas cell would be a contribution to safe operation of rigid airships.

16. Every effort should be made to develop and perfect such type of parachute as could be worn in an emergency without undue handicap in the performance of duty.

IV. *The flight from start to about 5:22* A.M. *(Eastern Standard Time), September 3, 1925.*

FACTS

30. The flight was made in obedience to lawful orders, issued by competent authority, and containing a prudential clause as follows: "Should the dictates of safety and the weather conditions existing make it advisable, the commanding officer of the *Shenandoah* is authorized to make such modifications in the above itinerary as he deems necessary, remembering, however, that this route will be published in the press and that many will be disappointed should the *Shenandoah* fail to follow the approved schedule."

31. Before leaving the Naval Air Station, Lakehurst, the commanding officer of the *Shenandoah* obtained and considered in consultation with the aerological officer of the ship the latest weather maps and reports.

32. The *Shenandoah* left the mooring mast at the Naval Air Station, Lakehurst, at 2:52 P.M., September 2, and proceeded on the Midwest flight.

33. The 8:00 P.M. weather reports were received, mapped, and studied by the aerological officer about 11:30 P.M., September 2. The scheduled weather report from Lakehurst for the region being traversed was received about midnight. These reports were discussed by the aerological officer with the executive officer who was on duty in the control car.

34. Between 3:00 and 3:30 A.M., the commanding officer, executive officer, and aerological officer, all of whom were in the control car, observed and discussed the first apparently unfavorable weather conditions. For the next two hours the weather conditions were under constant observation and discussion by the commanding officer and the aerological officer, who were in complete agreement in their conclusions except at one point when the aerological officer advised a change of course to the south. The commanding officer, after consideration and discussion, which developed that the aerological officer based his opinion not on any close or immediate danger but on the unusual movements of storm areas twenty-five to fifty miles to the northward, decided to adhere to the course of 260 degrees true.

OPINIONS

17. The commanding officer was entirely justified in starting the flight at the time chosen, as the weather maps and reports indicated nothing which would have rendered it unsafe or unadvisable.

18. The weather reports which were received and mapped between 11:00 P.M. and midnight, September 2, indicated nothing which rendered it unsafe or inadvisable to proceed.

19. A more extensive meteorological service, which would require more weather stations and more frequent broadcasting of reports, probably would greatly have contributed to the safe navigation of the *Shenandoah* on this trip.

20. Although subsequent events showed that a change of course to south when suggested by the aerological officer would have been advisable, the commanding officer's decision to maintain his course was a matter for his decision only, was made on his best judgment after discussion and consideration, and was based on the facts and conditions as then known or observed. Any error of judgment involved in this decision was entirely without negligence or blame.

V. *The flight from 5:22* A.M. *to 5:47* A.M. *(Eastern Standard Time).*

FACTS

35. During this period, constant watch was kept on aerological conditions by the commanding officer and the aerological officer, but none of

the usual cloud formations indicating abnormal air currents in the immediate vicinity of the ship were observed.

36. Prior to arrival at pressure height, all valve covers had been removed.

37. At the beginning of this period the *Shenandoah* was proceeding on a course 300 degrees true at a height of 1,800 feet, but was making little or no ground speed due to strong adverse winds. The airship at this time had a pressure height of 3,800 feet. At 5:22 A.M. the airship began to rise under the influence of vertical air currents; rose to a height of 3,150 feet in eight minutes; was brought under control and steadied at that level for six minutes; then rose again and more rapidly to 6,100 feet in ten minutes; dropped rapidly to 3,000 feet in three minutes, and finally rose again, sharply up by the nose, to probably 3,700 feet, at which point the ship broke. This last rise was accompanied by a movement of rotation of the whole ship in a horizontal plane and by violent rolling and pitching. During all these movements the ship was out of control. All the above figures are approximate only.

38. The average rate of rise during the first part was 170 feet per minute; during the second part 300 feet per minute, with a probable maximum of 700 feet in the last forty-two seconds. The average rate of fall was 1,000 feet per minute. The rate of the final rise is not ascertainable, but is immaterial, as the ship broke before reaching pressure height.

39. The existence of high velocity vertical air currents without accompanying cloud formations or other visible indications is unusual, but is a phenomenon known to meteorologists.

40. During this period of uncontrolled movements various recognized methods for bringing the ship under control, such as opening the maneuvering valves for five minutes, nosing down by means of controls, speeding up engines and letting go ballast, were utilized, but without result so far as obtaining full control of the movements of the ship was concerned.

41. The following sequence of events in the final destruction of the ship is indicated by the evidence. At or about the time the ship was at its highest altitude, unusual sounds within the body of the ship were heard. These sounds are variously described by different witnesses, but seem clearly to indicate the existence at that time of unusual stresses in some part or parts of the structure. The sharp rise by the nose, the rotation in horizontal plane, and the rolling and pitching of the ship during the final uncontrolled rise indicate the existence of large unbalanced external aerodynamic forces acting on the ship at that time. The next abnormal event was a cracking of the struts of the control car. The first break in the main structure of the ship occurred between frames 120 and 130, resulting in separating the ship into two parts, the control car remaining attached to the forward section. In something less than a minute thereafter the control car broke loose from the forward section and dropped to the earth. About the same time a second break occurred in the aftersection of the ship between frames 100 and 110. The mid-ship action thus broken off, with power cars Nos. 4 and 5 attached thereto, dropped almost directly. The aftersection dropped more slowly and was carried by the wind a distance of about one third of a mile before reaching the earth. The forward section was operated as a free balloon by the personnel left therein and was landed safely about twelve miles from the scene of the disaster.

Opinions

21. During this period the measures taken by the commanding officer to bring the *Shenandoah* under control were in accordance with the best-established practice.

22. During this period of extreme danger the conduct of all officers and men was deserving of the highest praise. The commanding officer showed

skill, courage, and fine qualities of leadership. All other officers and men showed an intimate knowledge of their duties, fine discipline and morale, and great courage. The handling of the forward section of the ship as a free balloon by Lieutenant Commander Rosendahl and Lieutenant Mayer was particularly deserving of commendation.

23. Although testimony of both operating and scientific experts is to the effect that, subject to certain qualifications, gas pressures sufficient to produce permanent strains or actual damage in the structure probably did not exist at the highest point of rise of the ship, the facts (*a*) that sounds of a nature indicating unusual stresses in the structure were heard at this time, (b) that the calculations on which expert testimony is based are arrived at through assumptions which are of necessity open to error, and (*c*) that some of these assumptions for their validity depend upon precision in the action of personnel and material, all taken together justify the opinion that gas pressure due to altitude and rate of rise may well have reached values sufficiently high to produce some damage to structure.

24. The exact nature or extent of this damage is not ascertainable, but was probably not sufficient to have endangered the ship under normal operating conditions.

25. Valve covers having been removed prior to arrival at pressure height, they could not have had any influence on the loss of the ship. Nevertheless, the practice of leaving any valve covers in place at any time after an airship takes the air is considered unsafe and inadvisable.

26. The final destruction of the ship was due primarily to large, unbalanced, external, aerodynamic forces arising from high velocity air currents. Whether the ship, if entirely intact and undamaged, would have broken under the forces existing, or whether prior minor damage due to gas pressure was a determining factor in the final break-up, are matters which this court is unable definitely to determine.

27. The change resulting in a reduction of the number of gas valves was inadvisable. The initiation and urging of this change by the commanding officer of the *Shenandoah,* the recommendation for its approval by the commanding officer of the Naval Air Station, Lakehurst, and its final approval as an experimental installation by direction of the Chief of Bureau of Aeronautics appear, in the light of subsequent events, to have been errors of judgment, but were arrived at after full and careful consideration by the most expert officers of the Navy in the operation and design of rigid airships, and do not in any way involve negligence or culpability.

28. Although the disaster to the *Shenandoah* indicates that a rigid airship can probably be destroyed through external aerodynamic forces only, and that such forces can arise from air currents unaccompanied by visible signs recognizable by aerologists in the present state of knowledge, it is the opinion of the court that such conditions and combinations of circumstances are unusual, and such a conclusion does not, therefore, throw doubt upon the safety and utility of rigid airships to a materially greater degree than does the fact that other types of craft for navigation in the air or on the water are likewise subject to destruction through unusual dangers which cannot invariably be foreseen and provided against.

VI. *Loss of life.*

FACTS

42. The following officers and men lost their lives through the destruction of the *Shenandoah:*

Lieutenant Commander Zachary Lansdowne
Lieutenant Commander Lewis Hancock, Jr.
Lieutenant John B. Lawrence

Lieutenant Arthur B. Houghton
Lieutenant Edgar W. Sheppard
Everett P. Allen
Charles H. Broom
James W. Cullinan
Ralph T. Joffray
Celestino P. Mazzuco
James Moore, Jr.
Bartholomew O'Sullivan
George C. Schnitzer
William H. Spratley

43. Chief Gunner Raymond Cole received slight injuries and Aviation Chief Rigger John F. McCarthy was seriously injured.

44. Of those lost, eight were in the control car, four in power cars 4 and 5, and two in the body of the ship at the time of the disaster.

45. The control car broke away from the forward section of the ship after the main break in structure and this minor break was probably a direct consequence of the major break. The method of attachment of the control car to the main structure was the same in its general characteristics as that employed on practically all previous rigid airships, i.e., suspension cables for completely supporting its weight, combined with struts only sufficiently strong for steadying the car in flight and designed to collapse before injurious stresses could be transmitted to the main structure in case of contact with the ground when making landings. This general method of support is similar to that employed for the suspension of power cars. Two rigid airships designed and constructed since the *Shenandoah* embody a new and improved type of control car which is directly attached by structural members to the main frame work of the ship.

Opinions

29. The deaths of all personnel resulting from this accident were due to injuries received in the line of duty and were not the result of their own misconduct.

30. The injuries of all personnel were received in the line of duty and were not the result of their own misconduct.

31. Although the design of the control car and its method of suspension were in accordance with sound and well-established practice at the time of the building of the *Shenandoah*, the newer design as embodied in the *Los Angeles* is considered better and safer for future construction.

32. Although it is possible that some lives might have been saved had parachutes been carried and been actually worn by officers and crew at the time of the break-up of the ship, this does not affect or modify the opinion expressed in O-14 above, that the use of the present type of parachute in rigid airships is not advisable. The lesser danger must be accepted to avoid the greater risk.

VII. *Loss of and damage to property.*

Facts

46. The loss of the *Shenandoah* was complete. Steps for the recovery of salvage from the wreck have already been taken.

47. Minor damage was done to private property belonging to three residents in the vicinity of the disaster.

48. A board was appointed by the Secretary of the Navy immediately after the loss of the ship, which was charged with the duty, among others, of making report in regard to damage to private property.

OPINIONS

33. The report of the senior member of that board adequately covers the matter of damage to private property, and the recommendations contained therein are sufficient to permit final decision and further action on the claims arising from this source.

VIII. *General*

OPINION

34. It may be accepted in the case of the loss of any craft at a certain place at a certain time that any change of action on the part of any individual directly or indirectly connected with the movement of such craft might have avoided such loss. In this sense, and in this sense only, can allegations of direct or indirect individual responsibility for the loss of the *Shenandoah* and the loss of life consequent thereon be supported. Such actions of individuals must be judged on the basis of the facts and established practices known and recognized at that time rather than on conclusions or deductions drawn after the event. Such actions of individuals as in light of subsequent events have been termed "errors of judgment," were, in the opinion of this court, clearly without negligence or culpability. The disaster is part of the price which must inevitably be paid in the development of any new and hazardous art.

35. The court is of the opinion that the recommendations of Professor Hovgaard, technical adviser to the Judge Advocate, in his technical analysis of the evidence, and of Lieutenant Commander Rosendahl, senior surviving officer of the *Shenandoah*, in his summing up of the case on behalf of the survivors, both of which recommendations deal with future development of rigid airships, are worthy of the most careful consideration.

36. The court is of the opinion that competent technical and operating officers should be detailed to study the great mass of evidence and exhibits forming a part of the proceedings of this court in order to collate it in such form as to be most readily available and useful for future reference in any further development in the arts of construction and operation of rigid airships.

RECOMMENDATION

That no further proceedings be had in the matter.

CASPAR F. GOODRICH

1847-1925

In Memoriam

IN THE death of Rear Admiral Goodrich, the American Navy lost an officer widely known for his distinguished professional attainments. The Naval Institute has lost one of its charter members.

It appears appropriate, therefore, that the pages of the PROCEEDINGS should render tribute to the honor of one who was an ex-president of the Institute, and who for over half a century labored for its success. Further, the Admiral was the prize essayist of 1898, the winning essay being entitled "Esprit de Corps—A Tract for the Times," a paper that has been not without great influence in moulding the character and morale of the commissioned personnel in our rapidly expanding Navy since that date. He was ever in the van in the struggle for the advancement of naval education.

His character may be best exemplified by a quotation from the essay referred to above:

> . . . . *esprit de corps* is the moral foundation of the edifice of naval efficiency, as well as the inspiration of individual success. Where *esprit de corps* is present the ship is harmonious and well disciplined; where it is absent, discord and inefficiency prevail. Sound organization demands the concurrent efforts of all toward a common end, the good of the service; in other words the recognition and guidance of *esprit de corps*. The seaman's art is valueless and his education is incomplete without it. There is no part of an officer's obligations and duties more vitally essential than the cultivation of this cardinal principle. By precept and example it should be especially drilled into the minds of those just embarking upon a naval career, until it becomes a second nature, entering into and controlling each act. Only to those who carefully take its lessons to heart is the full fruition of a naval life possible. It is the A B C of the profession, the primer of our art. . . . . This much, at least, is certain, no relief to the body of officers and no gentle improvement of the service as a whole can be obtained so long as individual interests are fostered at the expense of the Navy at large and so long as *esprit de corps* is regarded as of antiquarian or transcendental interest rather than recognized and proclaimed as a living and compelling force, the only bond by which to unite all the members of the naval profession, whatever be their rank or corps, in a homogeneous body of faithful, loyal, and patriotic servants.

SECRETARY'S NOTES

Membership: New members joining since last report:

Murray, J. D., Major, U.S.M.C.
Dyer, H. T., Mr.
Bird, J. L., Midn., U.S.N.
Karns, F. D., Ensign, U.S.N.
Weadock, Paul, Mr.
Alzamora, J. R., Comdr., P.N.
Baker, F. S., Mr.
Edwards, J. A., Midn., U.S.N.
Bacon, Robert L., Hon.
Tweedy, Edmund, Ensign, U.S.N.
Acuff, J. M., Lieut., U.S.N.R.
Nordhus, C. E., Lieut., U.S.N.R.
Ontaneda, P. C., Lieut. Comdr., P.N.
Bixby, A. H., Lieut. Comdr., U.S.C.G.
Garrett, J. L., Ensign, U.S.N.R.
Wallace, J. R., Lieut., U.S.N.
Craig, L. A., Major, U.S.A.
Brandon, T. O., Lieut., U.S.N.
Allgood, A. P. deF., Mr.
Coughlan, J. D., Major, U.S.A.
Johnson, F. K., Mr.
Billings, F. C., Ensign, U.S.N.
Pierce, H. W. (C.C.), Lieut., U.S.N.
Beckel, R. S., Lieut., U.S.N.
Forest, F. X., Midn., U.S.N.

Correction On page 193 of the January PROCEEDINGS, under "Book Reviews" there appeared a typographical error in the rank of the reviewer, and the statement therein should have read "Captain Thomas Frothingham, U. S. Reserves."

Aviation for Line Officers' Future Examinations The annual report of the Chief of the Bureau of Navigation, recently submitted, states that "plans are being made to include in the examinations of line officers for promotion the subject of aviation, covering general knowledge of the various types of planes and their strategical and tactical qualities. The service will be informed of the subject matter required, so that officers may have an opportunity to prepare themselves prior to the inclusion of questions on aviation in their examinations." The Naval Institute is the publisher of a book entitled *Naval Aviation,* which is one of the official textbooks for the instruction of midshipmen at the Naval Academy. It is believed that this textbook will cover a great deal of the ground referred to by the Chief of the Bureau of Navigation. It has met with widespread approval outside the limits of the Academy, favorable reviews of it having appeared in the technical and nontechnical press, the last review appearing in the January number of the *Scientific American.* The first edition of this book has been exhausted and a second printing ordered. An endeavor will be made to fill orders as fast as received. The price of the book is $1.75, postpaid.